BITS computing&communications news

OCTOBER 1995

COMPUTING, INFORMATION, AND COMMUNICATIONS (CIC) DIVISION • LOS ALAMOS NATIONAL LABORATORY

The Los Alamos Neutron Scattering Center (LANSCE) uses virtual reality technology to simulate errant beam conditions within the LANSCE facility. Results from these simulations aid in the design of shielding that will ensure the safety of LANSCE personnel. In this image, Ron Nelson (LANSCE) immerses himself in a virtual reality space where virtual shielding interacts with simulated neutrons as they spill into regions outside the target area. The LAHET (Los Alamos High-Energy Transport) code, developed by Dick Prael (XTM), was used to calculate the results of these simulations, and visualization techniques were developed by Laurie Waters (XTM). The virtual reality software was developed by John Fowler (CIC-8), and the cover image was composed by Genevieve Fox (CIC-8).

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CIC Customer Service Center . . . . . (505) 665-4444 or cichelp@lanl.gov

Integrated Computing Network (ICN)

Consulting:

Centralized scientific and engineering computing .....consult@lanl.gov or 7-5746

Lab-wide administrative and business systems .....labwide@lanl.gov or 7-9444

Passwords (required for access to ICN) .....validate@lanl.gov or 5-1805

Systems documentation (local and vendor supplied).....7-6992

Central Computing Facility (CCF) 7-4584

Advanced Computing Laboratory (ACL) 5-4530

Desktop Support Center (DSC) 7-4357 (7-HELP)

(PC Help for IBM and Macintosh personal computers)

For questions about PC software: PCSW-help@lanl.gov or 7-5884

For questions about PC hardware: PCHW-help@lanl.gov or 7-9372

For Macintosh questions: Mac-help@lanl.gov or 5-1361

For UNIX questions: UNIX-help@lanl.gov or 5-0433

For groups with CIC-2 support contracts: 5-2220

Telephone Services Center 7-3400

(includes voice mail)

Computer training

Lab-wide systems support training.....7-9444

Computer/workstation training.....7-9399

Personal computer training.....7-9071

Microcomputer support facility seminars.....7-4357

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Virtual Reality Comes to LANL

Virtual reality—you've read about it in the papers, seen it on TV and in the movies, perhaps experienced it at a game parlor or amusement park. Now you can enjoy the benefits of virtual reality (VR) right here at LANL with the Distributed Computing (CIC-8) group's new Virtual Reality system.

VR System Components

The term virtual reality was coined a decade ago to describe a new form of computer graphics that used an immersive environment to put the viewer in a synthetic space. This is done by using some or all of the following hardware:

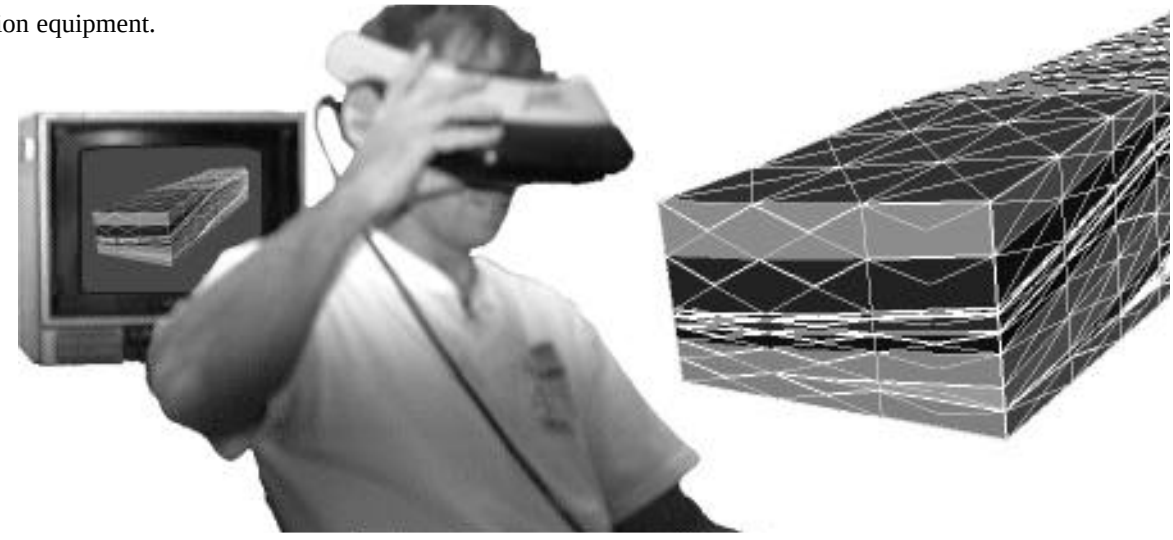
- one or more computer graphics rendering engines for generating viewable surfaces;
- head-mounted display (HMD) for viewing the virtual world while masking out the real world or, alternatively,
- 3-D liquid crystal glasses for viewing stereoscopic images projected onto a screen;
- data gloves and body suits for detecting positions and movements of the participants;
- position trackers to measure the location and orientation of the head and perhaps other objects;
- 3-D sonification for creation of an aural environment; and
- voice recognition equipment.

The CIC-8 VR system comprises the following hardware:

- Silicon Graphics RealityStation consisting of a 1-CPU Onyx computer, a RE2 RealityEngine for graphical rendering, two raster managers for scan conversion, and a multichannel option box for creation of the video signals. We are in the process of adding a HIPPI board for fast data acquisition from the LANL Open HIPPI Network.
- Kaiser Electro-Optics 500HRpv VIM HMD with two independent full-color liquid crystal displays and built-in Sennheiser stereo headphones.
- Polhemus Fastrack six-degree-of-freedom position sensor with a Threeball locator.
- Logitech Magellan six-degree-of-freedom controller.
- Pentium PC with Dragon Systems Voice Tools software, for voice recognition.

VR Applications

Although VR systems have been around for about a decade, they are just starting to find their way out of research labs and into useful production. This is due to a number of factors, including the recent availability of computing hardware fast enough to synthesize complex virtual environments, progress in liquid crystal display technology that makes available inexpensive HMDs of acceptable contrast and resolution, and the emerging ability to pursue major computing projects in three dimensions (see Figure below).



Harold Trease (CIC-16) examines a finite element grid constructed for the Yucca Mountain Project. Carl Gable (EES-5) created this model using the mesh generation code X3D. The VR machine allows users to have the experience of being "inside" the model. By using the kinematics of your body to move around the model, the VR machine greatly enhances the understanding of spatial interrelationships.

We are using the CIC-8 VR system to look at the results of 3-D computations. Here are some areas where we have had success:

- 3-D generation of nonuniform computational grids. We have used the VR system to understand how a grid generator connects the computational nodes to make cells. You can actually get inside a cell and look around to examine the connectivity and the relation to neighboring cells. And you can move around in the data set, exploring connections and interfaces at will.
- Dose calculation overlaid on geometry. The Monte Carlo program MCNP computes radiation fluxes and doses on computational solid geometry (CSG) objects. We have extracted the geometry information from an MCNP input file, using the Justine graphical user interface, and can view it for correctness with the VR system. We can move inside objects to view interior structures. Additionally, we have computed isosurfaces of MCNP dose calculations and can view these concurrently with the geometry.
- 3-D data from hydrodynamics calculations. In similar fashion, we can view interfaces and field isosurfaces from three dimensional hydrodynamics calculations. The VR system can read data from GMV (General Mesh Viewer) input files. We have also converted HDF (Hierarchical Data Format) data.

VR has gained more than a foothold and will continue to grow in importance in the following areas:

- Entertainment. Virtual amusement park rides have advantages over traditional rides. Injury lawsuits are almost nonexistent, and it is cheaper and faster to reprogram a virtual ride than to build a new "real" ride. VR video games are starting to show up in video parlors and at home (e.g., the Nintendo Virtual Boy).
- Architecture. Taking a virtual walk through your house before it has been built or through a jumbo jet during the design stage can reveal flaws while they are still easy to correct.
- Ergonomics. Testing virtual models of new consumer products also allows early detection of design problems.
- Medical. VR is being used in this field for surgical training, dose computation, and beam alignment for tumor irradiation.
- Training. VR can be used in many training scenarios where access to real facilities would be expensive, difficult, or impossible. Preparing a Special Forces military team to storm an embassy that they could not see in advance is an example of this training.
- Manufacturing. Augmented reality is a new application of VR to the area of manufacturing and assembly. Special HMDs that let you see through the computer-generated image into the real world are being used for by-the-numbers assembly. For example, at Boeing, augmented reality is being used to help workers assemble wiring harnesses by showing, through the HMD, the location of a virtual wire that the assembler then duplicates with a real wire.
- Database Visualization. Because you live in a 3-D world, you are accustomed to looking around at your surroundings, gaining information naturally about locations from head and arm positions. Three dimensions also give us much more room to place and locate things than you have on a computer monitor. You can place items in stacks around you, as you do in your office, and immediately go back to them without having to open and close windows or page through a long listing. And you can best view 3-D data by seeing it in 3-D.

Areas for Further Development

The advantage that VR has of freeing you from the keyboard and monitor, and putting you in space, brings with it a drawback. The keyboard-monitor based paradigms of mouse and window system must be supplanted with other means of interaction. This is an ongoing area of research. Perhaps the most natural approach involves gesture and voice recognition. We are in the process of implementing voice recognition on our system.

One of the many problems of computing in the real (3-D) world is that of having to handle huge data sets. We are in the process of hooking the VR system up to the LANL Open HIPPI network. This connection should let us have extremely fast access to data. We hope to use this ability to extract and present subsets of data. For instance, when you turn your head, new data will be needed to render what you are now seeing.

Of course, the visual aspect of reality is only one of many. We are also going to use sound cues to help in understanding data. This process, called sonification, generates audio frequencies that enhance the visual aspects of data or processes. For example, the switching frequency of a transistor that changes with temperature could best be presented sonically.

Experience VR for Yourself

We invite you to come and see the VR system. If you are just curious about how it works, we will be glad to give you a demonstration. If you have three dimensional data, we will convert it to a form the VR system can use. If you have other ideas about how the system could be used, we will be delighted to explore them with you. (If your data sets are classified, don't despair. We are working on a way to let our "behind the fence" customers use the system, too.) The system is located at TA-3, in building SM-132, room 248. It is presently connected to the open LAN.

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Distributed Computing Group (CIC-8)

Open House

There will be an open house for the Virtual Reality Laboratory and the Visualization Laboratory on October 19 from 9:00 a. m. to 4:00 p.m. The laboratories are located at TA-3, building SM-132, rooms 248 and 249-A, which are next door to each other. (Map available at http://www-c8.lanl.gov/graphics_vis/vis_video_lab/map.html.)

Making Visualization Work for You: CIC-8 Visualization/Video Laboratory

Visualization—you keep hearing about it and seeing it and wondering how you can apply it, but the choices are many, the information confusing, and the starting point evasive. The staff of the CIC-8 Visualization Laboratory can help you sort through the many choices available to efficiently leverage this powerful technology.

Services and Resources

Since 1990, we have worked to build a facility where visualization hardware and software are the main focus. Our visualization/video services include the following:

- Consulting on visualization tools and methods,
- Assistance with visualization techniques and software,
- Adaptation of visualization software tools for specific needs,
- Coding of specialized routines for project specific goals,
- Animation production from computer generated data,
- Recording facilities for PAGES production videos,
- Interactive recording sessions directly from workstation screens,
- Editing and titling of visualization videos,
- Audio dubbing onto visualization videotapes,
- Creation of digital video for delivery via the Internet, and
- Translation between various graphics file formats.

Our work in the Visualization Laboratory relies on a mix of software from three categories: locally developed, freeware/shareware, and commercial. We also maintain a list of various software in use at visualization laboratories around the country. This list is available in hard copy or on the Web (http://www-8.lanl.gov/graphics_vis/vis_software/vis_sw.html).

Available hardware in the Visualization Laboratory includes:

- SGI Onyx RealityEngine2 (4 processors) with 128 MB Memory and RealityEngine Graphics, running IRIX 5.3;
- SGI PowerSeries R4000-50 with 128 MB Memory and VGX Graphics, running IRIX 5.3 (currently available in the open network with plans to move it into the secure);
- SGI Indigo xs24 with 16 MB Memory and an audio processor, running IRIX 5.3;
- SparcStation 1+, running Sun OS;
- Macintosh Quadra 840AV with 16 MB Memory;
- Macintosh IIci with 32 MB Memory;
- Video recorders: Sony laser disk, 1/2" VHS, 3/4" broadcast quality, Hi-8, Canon Still Video; and
- Data input devices: image scanner, video digitizers, and CD-ROM.

Charges for Visualization/Video Services

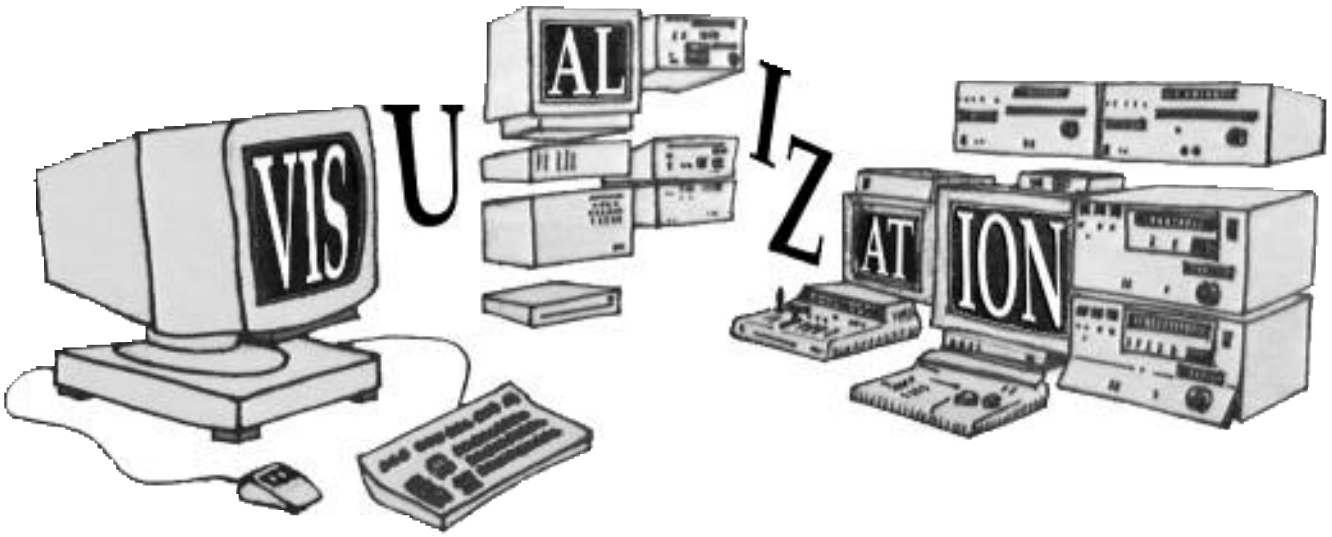
Initial consultation on visualization packages and techniques is free. We do charge for services beyond general consultation. These charges are incurred when the client has a particular project for which Visualization Laboratory personnel can help implement a solution. Such help includes preparing data for different software packages, writing project-specific code, and customizing a video that has come through PAGES. When billing at an hourly rate, our cost is $100/hour. Rates for weekly or longer time periods can be negotiated.

An example of chargeable work is customizing videos. When clients transfer their images to PAGES or bring their images directly to us for video production, the images are recorded sequentially to video disk. Then, before recording them to video tape, we can meet with the client and decide on playback speeds and number of repetitions to make the videos as informative as possible. The client can also specify titles and decide how many copies of the recording are needed. We do not charge for this work if it takes 30 minutes or less (as is normal with a video job that has been sent through PAGES). If the client wants more detailed customization, we discuss the amount of time involved and agree upon the final form of the video and the final cost.

Please give us a call if you have a specific project in mind and would like to see how we can help you and what the cost will be.

Future Developments

We are experimenting with the uses of distributed visualization, parallel visualization, and the production of visualization through the mining of large data sets. Currently we are able to produce secure videos via stand alone workstations and are in



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the process of automating secure video capabilities on both the SGI and Sun platforms.

Contacts for More Information

If you have any comments or suggestions that would make the CIC-8 Visualization Laboratory more useful to you, please send them to vizlab@lanl.gov or fill out our survey (see URL below).

Phone numbers: 667-6880, 667-4713, 667-8266

E-mail: vizlab@lanl.gov

Visualization Laboratory Home Page: http://www-c8.lanl.gov/graphics_vis/vis_video_lab/vis_lab.html

Software List: http://www-c8.lanl.gov/graphics_vis/vis_software/vis_sw.html

Hardware List: http://www-c8.lanl.gov/graphics_vis/vis_hardware/vis_hw.html

Visualization Laboratory Survey and Comments Form: http://wwwc8.lanl.gov/graphics_vis/vis_video_lab/survey.html

Genevieve Fox, genevieve@lanl.gov, (505) 667-688
Distributed Computing Group (CIC-8)

New Customer Assistance Desk for CCF

September 5, 1995, marked the opening of the new Customer Assistance Desk (CAD) for CIC Division's Central Computing Facility (CCF). The CAD serves as the pick up point for CCF customers to receive classified output and as the central dispatch for incoming CCF telephone calls and inquiries. The CAD also controls access to the limited access areas within the CCF and LDCC (Laboratory Data Communications Center). Currently, CIC-17 (Media) is responsible for the operation of CAD, but they work in close cooperation with CIC-7 (Computing), CIC-11 (Storage), and CIC-18 (Facility Management).

The new CAD is located at TA-3, SM-132, RM-260 (across the hall from the CIC-18 group office), approximately 100 feet down the hall from its former location. We invite all of our customers to stop by and see the new CAD.

The hours of operation for the CAD remain the same: 7:30 a.m. to 4:30 p.m., Monday through Friday. If you have any questions about the location of the new CAD or the services it provides please call the PAGES operator at 667-2905.

Reuben Roybal, 665-2074, 667-2905 (PAGES), or 104-6906 (Digital)
PAGES Team Leader, Media Group (CIC-17)

Adopting Desktop Standards to Expand Lab-Wide Information Sharing

Will Laboratory personnel ever be able to share information easily to solve mutual problems and produce compatible and consistent results? Yes, according to the Desktop Standards Team of the Information Architecture (IA) Project. We on the team are working to make life for desktop computer users easier and less expensive by recommending computer hardware standards and a common set of desktop tools for use throughout the Laboratory.

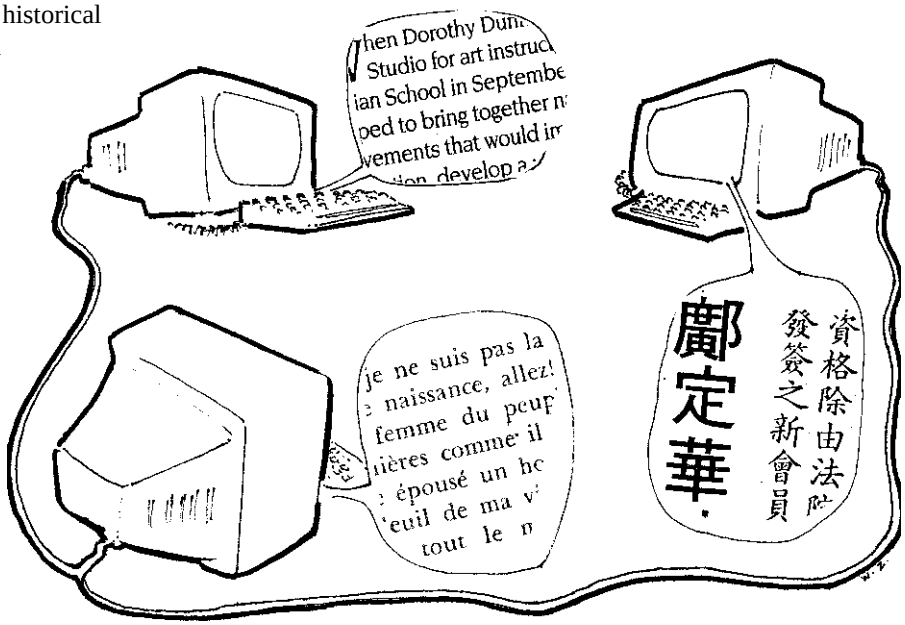
The Desktop Standards Team was formed through open membership last October as part of the IA's Design and Implementation Planning Phase. After getting acquainted, we took steps to gain a better understanding of desktop systems throughout the Laboratory by analyzing installed bases, historical procurement patterns, and recent purchasing trends. For example, did you know that there are over 15,000 desktop systems being used at the Lab and that about 40% of these are IBM-PC/PC clones, 40% are Apple Macintoshes, and 20% are UNIX workstations?

Why have standards?

Having common desktop tools in use Lab-wide will significantly improve our communications and information-sharing capabilities, enable the Laboratory to institute bulk procurement mechanisms to reduce hardware and software costs, and make it easier for the Laboratory to provide all of us with enhanced, up-to-date technical support and training.

How are standards being developed?

The Desktop Team earnestly began its standardization efforts in March 1995 when we reviewed the results of a Lab-wide survey sent out to 600 randomly selected employees by the IA Metrics Team. Thank you to all who responded to this survey;



you really helped us to understand what you use and what you like and dislike about your computer. The Desktop Team used, and will continue to use, these survey responses as well as other data to develop recommendations for Laboratory-wide desktop hardware and software.

In addition to analyzing survey responses, we employ another means for obtaining Lab-wide input, the Request for Comment (RFC). RFCs are IA's primary process for soliciting Lab-wide feedback about proposed guidelines and standards. Various IA teams publish RFCs on the Web for three weeks to let Laboratory personnel know about these recommendations and make comments. When necessary, the team revises the RFC according to the input and resubmits it for further comment. The anticipated result of this iterative process is an IA-sponsored standard tailored to Laboratory needs.

Hardware Standards Recommended

The first recommendations the Desktop Team developed were guidelines for hardware configurations. Because desktop hardware is driven largely by industry and marketplace trends, hardware standards were relatively straightforward to develop and have already been through the RFC process. The Desktop Team reaffirmed Macintoshes, IBM PC/PC clones, and UNIX workstations as standards for Lab-wide desktop systems. The Desktop Team also recommended the following 3-tiered specifications hierarchy.

1. An acquisition guideline ensures that new hardware is sufficiently capable of handling newer applications developments.

2. A minimum guideline ensures that the hardware is capable of meeting current and near-term needs.

3. A legacy guideline helps users in replacing or upgrading existing hardware.

Thank you to those who responded to these hardware RFCs. These comments helped us to revise and better clarify our recommendations, particularly for UNIX workstations.

Adopting Software Standards Requires Tough Choices

Recommending hardware is far more straightforward than recommending software. The Laboratory community uses a wide variety of software packages, and because standardization is by definition a selection process, not all currently used products can emerge as standards. Consequently, all of us will have to make some tough choices.

Before even considering developing software recommendations, we wanted to learn about computer users' favorite desktop tools and benefit from their insights. To accomplish this we published a Lab-wide Request for Help (RFH) on the Web. We also distributed the RFH by an E-mail chain letter and by E-mail to Master Management. Thank you to the almost 250 people who responded with their support and comments. Because of this success, we plan to continue to use RFHs to gather initial Lab-wide input on a variety of issues that lie before us.

Software Standards—Work in Progress

The Software Standards RFH identified nearly 30 functional categories for potential standardization and encompassed over 160 applications in use at the Laboratory. We are now in the process of classifying these categories based upon the broadness of their Lab-wide applicability and are working to determine the most appropriate products to recommend as Laboratory standards. To make these software selections, we are using a combination of the following criteria.

1. The software has a large, installed base, which means it is already a Laboratory de-facto standard.

2. The software has interoperability, moving us toward better Lab-wide information sharing, not away from it.

3. The software has technical capabilities that meet the needs of most Laboratory users.

4. The software supplier consistently provides dependable service, quality, maintenance, and documentation.

By the time you read this, our first in a series of Desktop Software Standards RFCs will have hit the streets via both E-mail and the Web. Please take the time to read it and send us your comments. Only with your help, support, and indulgence can this effort truly succeed.

Desktop Team Helps BUS Division

In addition to developing Lab-wide desktop standards, we stand ready to assist individual Laboratory organizations with their own desktop standards development. To improve communications, curb costs, and expedite business, BUS Division Senior Management initiated an internal desktop standardization effort in April. The Desktop Team helped BUS personnel to conduct a user survey, to send out an internal RFC, and to develop desktop standards that met division needs while maintaining a perspective that allowed BUS employees to communicate and share information Lab-wide. BUS adopted these desktop standards in August 1995.

Would you like assistance?

In FY96, as the Laboratory strives to increase productivity and lower costs, the Desktop Team is eager to work with your organization to make information sharing easier and less expensive, to assist you in addressing desktop or other related issues, and to be of any other assistance.

The IA Desktop Standards Team

For assistance or to ask questions about desktop standards, send E-mail to the Desktop Team at ia-desk@lanl.gov or contact Frank W. Bobrowicz, 665-5531.

The starting Web location for finding RFCs, RFHs, Standards, and Guidelines is http://www.lanl.gov/projects/ia/stds

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Desktop Standards Team Leader, Desktop Group (CIC-2)

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(505) 665-4668
Communications Arts and Services (CIC-1)

Older UNICOS Software Being Retired

These tools have been on our systems for some time serving a purpose that is no longer paramount. As of the December 1995 change control cycle, all of the tools listed below will be removed from all UNICOS systems. If you have questions regarding this change, please contact the ICN Consulting Office at consult@lanl.gov or (505) 667-5745.

archive	cgm library	dearchive	gas	mvi
rasview	top	vt2host	vt2pc	vtou

Notes:

(1) ARCHIVE and DEARCHIVE are simple scripts to tar/untar a directory and store it to CFS. If users want these scripts the source is on CFS as /ccx/unix_scripts/archive and /ccx/unix_scripts/dearchive.

(2) The GAS library will now be maintained by Tom Gorman of X-Division. If you wish to use this library please contact Tom at tjg@lanl.gov or (505) 667-8115.

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Computing Group (CIC-7)

Students Contribute to Scientific Data Management (SDM) Project

There were no "make-work" jobs for two co-op students and three undergraduate students (UGSs) at the Laboratory this summer. Instead, they made significant contributions to the work of the Laboratory. Two students with CIC-7, two with CIC-12, and one with CIC-8 wrote software programs for the SDM Project and helped to develop its World Wide Web pages. The students were made an integral part of the SDM team and were given real work to do. As student David Bonal (http://www.nmt.edu/~bonal) said, "I had the responsibility to actually complete a software project from design to release for a prominent scientist here at Los Alamos." Bonal is a second-year student at New Mexico Tech in Socorro.

Student Rick Lowe pinpointed one reason for the students' success, "The SDM team was very good at striking a balance between too much and too little direction. They offered support and training in what is involved in coding for a large project while still leaving enough freedom for me to feel that I had a significant role in the project's development." Lowe is a senior at Ripon college in Wisconsin.

The other students were Dolores Gonzales, a junior at UNM at Albuquerque; Joe Madrigal (http://www.unm.edu~madrigal/Joe_Cool.html), a senior at UNM in Albuquerque; and Graham Ollis (http://www.ollisg@lahs.losalamos.K12.nm.us), a Los Alamos High School graduate, who is headed for the University of Arizona (see Figure below). This summer's SDM team members and mentors to the students were Gail Anderson, CIC-12; Cherie Hale, CIC-12; Rick Light, CIC-7; Sherrill Lysaght, CIC-8; Pat Medvick, CIC-12; Jo Ann Painter, CIC-12; and Team Leader Ron Pfaff, CIC-7.

Students made significant contributions to the SDM Project. Left to right they are David Bonal, Graham Ollis, Rick Lowe, Dolores Gonzales, and Joe Madrigal.

The Laboratory's SDM team is developing software tools and techniques that allow scientists to better manage massive, distributed resources and, thus, to increase their productivity. Presently, without SDM tools, scientists invest an enormous amount of time to keep log books of where data files are and what is in them. Important data are hard to find and are sometimes lost. SDM tools let the user think in terms of his or her data sets, rather than in terms of files. A future BITS article will describe further what SDM is and how it is used. In the meantime, see the SDM Web pages at http://www-c8.lanl.gov/sdm.

The students worked on the foundations that will be used to build SDM tools. They wrote documentation used in defining the SDM software development environment. Lowe worked on the C Style Guide, all the students contributed to the glossary, and Ollis enhanced a clip art library (http://www-c8.lanl.gov/icons). Madrigal, Gonzales, and Ollis developed an SDM demo with a GUI (graphical user interface). The major SDM foundation the students worked on was CMD-PACK (command pack), a package that will allow the SDM team to add commands easily to an SDM command-line interface. Lowe developed the command-line parser, and Gonzales wrote a driver that lets users run the utility interactively or as a one-line command. Gonzales, Bonal, and Ollis also worked on specific SDM capabilities and commands such as a menu tool, log search, and database routines.

To strengthen their abilities to work on SDM foundations, the students received training and then used the Perl programming language, an interpreted, scripting language as opposed to a compiled language like C or Fortran. They also updated their skills in such areas as C, X Windows, UNIX, World Wide Web authoring, and different types of utilities and user interfaces and learned new programming strategies. Perhaps more importantly, they learned to work as members of a team with attendant responsibilities and accountability for their work. The accountability came when the programs they wrote were used by scientists. They also learned how to meet with customers and assess their needs. In working on an informal SDM Project review with group management, they learned the requirements of presentation materials.

One of Bonal's projects had immediate application. His customer was Bob Malone of the ACL, who is head of the Global Climate Modeling Project and an SDM user. Malone says he must archive as many as 50 files per day, up to 10 gigabytes of data per day. Without Bonal's tools, it took 10 or 20 minutes to look carefully through this much data. Now, with SDM5, the Perl program written for him by Bonal, it takes a minute to go through it. What SDM5 does is to make it easier for users of HPDS (the high-performance data storage device) to keep track of what files are stored and whether or not they were stored properly, without having to painstakingly dig through them. Now it is easy to interrogate the system for files stored on a certain date, by a certain user, by file name, or by job identification. Malone appreciates the built-in redundancies such as the e-mail warning that appears if there is a problem in storing a file. He says Bonal was, "...enthusiastic, industrious, and responsive to requests for improvements and changes to his program."

"Startup kits" provided by the team helped the students hit the ground running with tips on setting up hardware, getting on the necessary e-mail lists, getting Web access, and navigating the integrated computing network and ACL environments. This year's students suggested the addition of startup files and a glossary, which have been created to assist students in the future. Being collocated also helped. As Gonzales said, "...having offices close together in a central location...We solved many programming problems by being able to talk to one another quickly and easily." Finally, their frequent contact with other SDM team members, who treated them as full partners, solidified their experience of making meaningful contributions to science at Los Alamos.

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Communications Arts and Services (CIC-1)

ADSM Now Available

On October 1, 1995, CIC Division made the Adstar Distributed Storage Manager (ADSM) available as a fully supported production system. This date marks the culmination of a year of successful "friendly-user" testing here at LANL. ADSM is an IBM client/server software product that provides full and selective backup services for client machines such as PCs, Macs, many UNIX-type machines, and NFS file servers. ADSM can back up the client machine automatically according to a schedule requested by the user or the client can be backed up manually by the user at any time. Initially, ADSM does a full backup of a workstation; thereafter, it copies only those files that have changed since the last backup. A restore of a backup at the file-level can be done at any time, and all file attributes (permissions, etc.) are restored.

ADSM file size limit is 2^{64} bytes, which is roughly $18x10^{18}$ bytes or 18 exabytes (18,000 petabytes; 18,000,000 gigabytes; or 18,000,000,000 megabytes). Its maximum path length is effectively 1,280 characters. In comparison, CFS allows a 96-byte path length, and the maximum file size is almost 2 gigabytes (2,147,443,200 bytes). ADSM stores its data on the same types of automated and highly reliable media that CFS uses.

FY 1996 charges for ADSM are as follows:

$71.40	One-time registration fee to cover the cost of the software license from IBM.
$14/month/machine	Monthly service charge, which covers unlimited backups.
$2/gigabyte/month	Monthly storage fee.

To use ADSM, you must first register your workstation with the ADSM server in one of several ways. You can register on the Web at the site http://storage.lanl.gov/adsmreg.html or via CIC-2's Electronic Software Distribution page at http://ns-cic2.lanl.gov/esd. To complete registration, you must have your machine's network node name, your cost code and program code, and your z-number. You will also be asked to set your own ADSM password for access, to choose one of four automatic backup schedules (6 p.m. to 6 a.m. is the default), to choose when or if you want to be notified that an automatic backup has failed, and to choose who (if not you) should be notified if it does fail. You can also register by e-mail if you provide the above information to adsm_help@lanl.gov. If you don't have access to electronic mail or the Web, you can call the ICN Consulting Office at 667-5746 for help. Further information about ADSM and the client machines it supports is available on the Web at http://storage.lanl.gov/adsm.html.

Tom Stup, ADSM Team Leader, adsm_help@lanl.gov

The Digital Village Project

The Scenario

You've got a meeting in Washington, so you log onto the Internet, pull up an aerial map of Washington, do a series of zooms into the area where your meeting will be held, choose a likely looking hotel (from the size of the tennis court in the photo!), click on the hotel, see a video walk-through of some rooms, get room rates, and make a reservation using your encrypted digital cash account. Welcome to the Digital Village! You have just experienced what most assume will be a reality in the near future. However, there's a lot of work to be done, and CIC Division employees are working in the trenches, in the present, to make this reality possible.

Building the Digital Village

The Digital Village Project at Los Alamos (http://www.C3.lanl.gov/village) is the popular name for LIST (Los Alamos Information Systems Technologies), which seeks to develop technologies to facilitate the creation of "telecommunities" in the National Information Infrastructure. Telecommunities are defined as communities that exist and function through electronic communications. Members of a telecommunity may have interests in common other than their geographic location, such as a hobby, politics, entertainment, commerce, or a narrow specialty of science.

The goals of the Digital Village Project are to develop technologies to enhance the capabilities of information systems on the Internet to serve these telecommunities. The World Wide Web (WWW) is one such information system. Present systems do not provide the necessary cross-platform, cross-software flexibility; security, authentication, and verification of commercial transactions; or real-time, two-way, multimedia communications. These are some of the features that must be provided by a user interface for the WWW of the future and, thus, are the challenges for CIC personnel working on the project. In addition, these interfaces should be extensible wherever possible, have components as close to plug-and-play as possible, be customizeable, and be easy to integrate into kiosks that are accessible to everyone, including people with disabilities. Security and privacy features must be developed for commercial uses, and "information mining" (the access to information that is now scattered all over the Internet), must be improved.

The Digital Village is an effort supported by CIC-3 and CIC-12. The remainder of this article will focus on the work of two CIC-12 programmers, John Hall and Mark Zander.

MrSID Excites Developers

To return to our scenario, the capability to use a digital, orthographic, aerial view of a geographical location, zoom in and out, and view it at different resolutions is being developed by Hall. At Apple's worldwide developer conference Hall demonstrated MrSID (http://www.C3.lanl.gov/~cjhamil/Browse/main.html), a seamless image database with these capabilities. Developers in attendance were excited by the demonstration, and Apple has asked permission to put MrSID on DR3 (the third developer release) of OpenDoc that will go out to all Apple developers. MrSID is an OpenDoc viewer for very large images. These images are compressed using Wavelet transforms. Images are decompressed first at a low resolution of the entire image and then later as zoomed areas of interest.

Other applications of MrSID include interleaved decompression, so that a user can see a low-resolution image before seeing a slower decompression of the high-resolution image, allowing him/her to stop decompression if the image is not of interest. Also the user can import just the focus of interest rather than the whole memory-intensive photo.

Integrating Photos, Movies, and Spreadsheets on a Web Site

Again returning to our scenario, current WWW capabilities to integrate photos, movies, audio, spreadsheets, and other features often depend on launching other applications in addition to the Web browser. Hall and Zander are working to add new features to Web browsers such that these features may be added and launched automatically within the window where they are displayed, regardless of the user's platform.

Several new software development programs make this enhancement possible. The trend now is to get away from mega-applications that try to be "everything for everyone" and lose their user-friendliness in the process. The trend is toward cross-platform, mini-applications that fill specific needs. This trend is sponsored by the Component Integration

Labs (CI Labs), a consortium of Apple Computer, Inc.; IBM Corporation; Novell, Inc.; Oracle Corporation; Taligent, Inc.; WordPerfect Corporation; and XSoft, a division of Xerox Corporation. CI Labs seeks to make software development more innovative, more profitable, and inclusive of a greater number of developers.

To develop the parts themselves, the CIC-12 programmers are using CI Labs' OpenDoc cross-component architecture (see Figures 1 and 2). OpenDoc is a set of cross-platform application programmer interfaces, an object-oriented document technology that allows new parts to be created and added in with previously supplied parts. OpenDoc applications are designed to allow code from several sources to cooperate in producing compound documents, documents that can embed almost any kind of content inside of them; each part includes its own part handler. OpenDoc parts do not have to be compiled with the previously combined parts or even linked with them but actually can be added into documents while they are running. OpenDoc enables a class of applications that can support compound documents, can be customized, and can be used collaboratively.

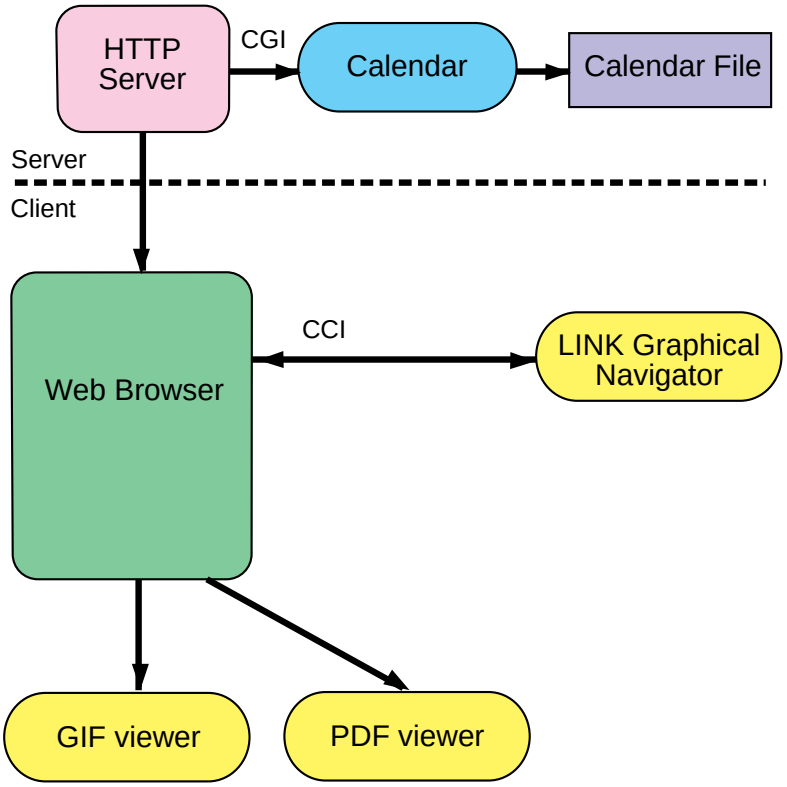

Figure 1. Current Web Software Architecture

OpenDoc parts would include the aerial photo, the movie, the spreadsheet with the hotel's rates, and so on. It allows "part handlers," the code that's used to edit and view the part, to be written in a variety of languages, both object-oriented and procedural.

Providing Security for Commerce on the Internet

OpenDoc allows parts to embed other parts within them. An embedded part can become a container so the hierarchy can be extended to further levels. Requiring a password to access a container might be a way to provide security for commercial ventures on the Internet. Your bank needs access to your encrypted digital cash account so that it can make deposits. You need access so you can authorize the hotel to draw the amount to cover a night's stay. The hotel needs access to make the withdrawal. Many ideas such as using passwords and encryption/decryption have been offered, but none so far are foolproof. Zander and Hall are on the front lines of this discussion.

Do you want to get ads from hotel chains? Should hotel chains have access to your personal habits including how often and where you travel? Vendors want buyer profiles; they compile them now from other sources. You want to be free from electronic blizzards of advertising. The issue of security, then, extends to that of privacy or anonymity. The Los Alamos people who are working in the Digital Village Project are studying these and other philosophical concerns.

The goal is to balance the government's vision of the Internet as a public access information tool with the needs of the commercial interests who will contribute to the development and funding infrastructure of the Internet.

A New, More Functional Web Browser

In addition to security issues, Zander and Hall are concerned with ways to make it possible to add more functions to the Internet that telecommunities can use. The next step is to combine the capabilities of OpenDoc and the Web through a Web browser. Such a browser, called "CyberDog," is under development by Apple. CyberDog offers a set of parts that includes a gopher, an ftp, a HyperText Markup Language viewer/editor, a HyperText Transport Protocol layer, a GIF/JPEG viewer, and a logging record. Programmers at the Laboratory hope to use CyberDog to demonstrate that parts developed here can be integrated with parts developed by programmers elsewhere in ways that will easily add more functions to the Internet. The result may just make it possible for you to select and pay for your room in Washington and to mine the resources of the entire Smithsonian Institution before and after your visit as well!

Ann Mauzy, mauzy@lanl.gov,
(505) 667-5387
Communications Arts and Services
(CIC-1)

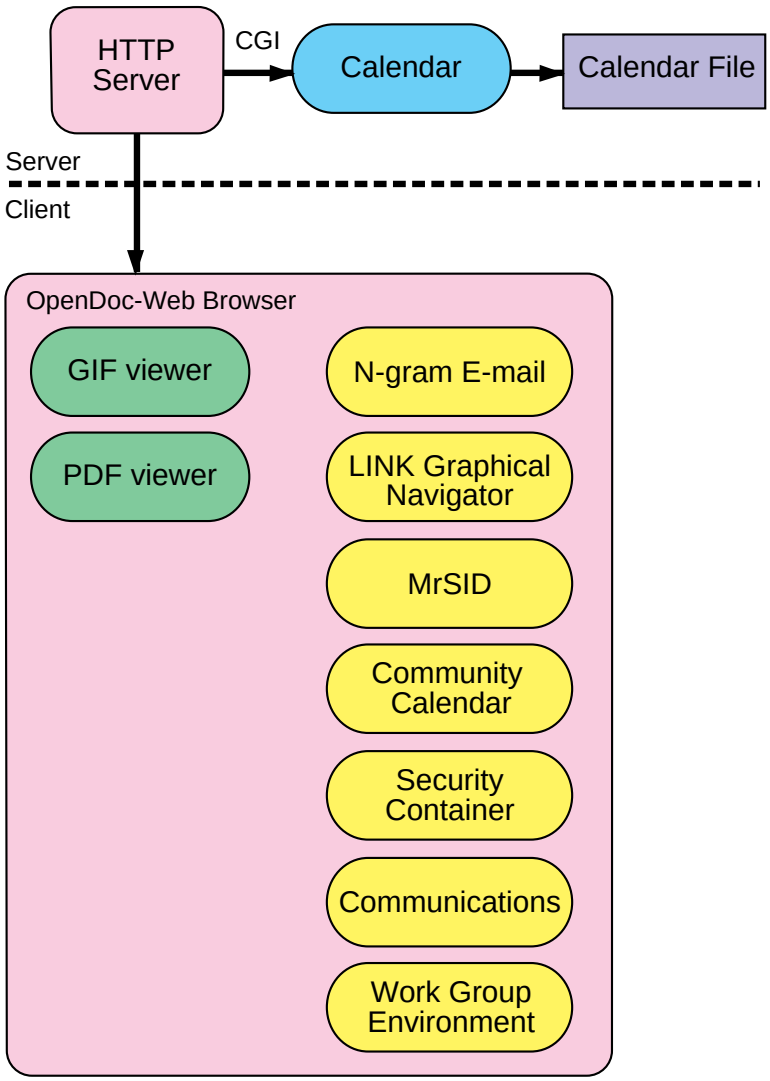

Figure 2. OpenDoc Web Software Architecture

ICN Password Renewals: More Frequent but Easier

First, the bad news. Effective October 1, 1995, ICN passwords in the open and secure environments need to be changed semiannually instead of annually. This requirement is mandated by DOE orders for classified/secure computing and is also being applied to open/administrative computing because of the vulnerabilities inherent in increased Internet connectivity.

But the news isn't all bad. Although renewing passwords for classified/secure computing is still done via the paper process, you can now change your own password for open/administrative computing via on-line renewal—either when the password comes up for renewal or at any time you want beforehand. (Providing an on-line password renewal procedure for classified/secure computing is our next project.) So if you're concerned your password may have been compromised or "sniffed," simply log on and change your password to a new one. Change it as many times as you want at no charge.

How do I change my password?

Sign onto the register machine, select "Change your ICN password," and follow the prompts. Five passwords will be displayed. Decide on the one you want or request another set of five. When you select a password, it goes into effect immediately and your expiration date is bumped, or moved forward, 6 months.

How will I know when my password needs to be renewed?

The Password Office will notify you by e-mail one month before your password expires.

What if I don't obtain my new password on-line within the specified time?

Your ICN account will be blacklisted, and when you attempt to log on, a message will be displayed indicating your password has expired. If this happens you will need to contact the Password Office for further instructions.

What's the advantage of obtaining my password on-line?

There are several advantages. (1) You get to choose your own password from the displayed list. (2) You don't have to guess when the password will change because the new password goes into effect immediately. (3) You don't have to sign and return a password receipt. (4) No one else knows your password, not even the Password Office. (5) You reduce overhead, which includes the time and materials spent in generating, printing, packaging, and delivering the password notification to you; the time you spend signing the receipt and mailing it; the mail carrier's pickup and delivery time; and finally, Password Office time in opening, time stamping, sorting, filing, and archiving your hard copy password receipt.

What if I forget my password?

Your password is stored in encrypted form so no one can read it—not even the Password Office. Therefore, if you forget your password, the Password Office will have to provide you with a new one. If you're afraid you'll forget your password, plan ahead and store your new password under administrative control, e.g., in a locked file drawer. Do not store it on your computer. When you change your password, try to select one that is easy for you to remember.

Please refer your questions and comments to the Password Office at 665-1805 or validate@lanl.gov.

Sharon Wilhelmy, sw@lanl.gov, (505) 665-6328
Customer Service Group (CIC-6)

CIC-11 Announces the Availability of NFS

The Network File System (NFS) servers, which have been available at no charge during their development and testing phase, became available for full production service on October 1, 1995. The NFS servers offer a new storage capability for workstations, desktop computers, supercomputers, and all other computing platforms around the Laboratory. The NFS servers provide a remote UNIX "filesystem" that looks and acts like a local filesystem. Projects large and small can utilize this service to provide centrally located files that are available to remotely located desktop computers, workstations, and ICN computing hosts (i.e., Crays, Cluster, and Connection Machines).

The addition of this service is part of C-Division's overall strategy to provide services that support distributed computing and information sharing in the UNIX computing environment. Data on the NFS servers is backed up nightly and can be mirrored if the customer desires. The servers currently represent close to 1 terabyte of on-line storage and can be scaled as necessary to support usage, storage, and performance requirements.

The questions and answers below provide some basic information about the NFS.

How much does it cost?

The proposed charges for the NFS service are

$35.00 per Gigabyte per month

(Note: A gigabyte is 2^{30} bytes or 1,073,741,824 bytes.)

NFS storage is represented by filesystems that are owned by specific customers. The initial setup requires customers to determine the size of the filesystem(s) they will need (filesystems can range from 1 to 32 gigabytes). Storage allocated to a filesystem is proportional to the actual storage capacity of the physical disk drive. As a result, charges for storage are, in most cases, based upon the filesystem storage reserved rather than the amount of data in the filesystem. The exception to this is Laboratory-wide filesystems that contain home directories or temporary storage. There are no charges for file accesses, directories, or file counts (inodes). Filesystems are also reserved for the exclusive use of the filesystem owner and cannot be used by any other customer using the NFS, unless the owner allows it.

What kind of performance does the NFS service provide?

NFS performance depends on the I/O capability of the client accessing the data, the load on the network, and the number of routers the client must navigate through to get to the server. The NFS servers can handle over 4000 I/O operations per second and have 8 FDDI connections and numerous processors to support hundreds of simultaneous accesses. A benefit of NFS is that data is served a block at a time (8K blocks), allowing an application to operate on the data immediately, before the entire file is transferred. Data can also be accessed randomly rather than sequentially. We plan to put NFS servers in remote sites around the Laboratory to bring closer and faster service to customers outside the TA-3 area.

How do I get storage on the NFS server?

Customers can contact the NFS Team (nfs@lanl.gov) about their storage requirements. We will be happy to discuss how NFS might support your project, what types of benefits and problems it might introduce into your application, and help you decide whether using the NFS is appropriate for your needs. To create your filesystem, we will need to know what platforms require access to the storage, user IDs (UIDS) of those who will have "write" access to the storage, and contact information. Storage on the NFS servers may be used to make data available as "read only" to the entire Laboratory (/usr/lanl and WWW pages are set up as read-only) or be made available exclusively to members of a project. We will also interface with other CIC teams for customers who want their NFS filesystem to be accessed from the Crays and/or Cluster.

What are some of the limitations of NFS?

File sizes in NFS are limited to 2 gigabytes, as are file sizes in most UNIX operating systems. Filesystem sizes can be up to 32 gigabytes. The file size limitation will disappear with the release of NFS version 3, which is expected to be available in the Spring of 1996.

How is the NFS storage accessed?

Once a filesystem is set up and "exported" to specific client computers or Laboratory-wide, each client computer must "mount" the NFS filesystem to access the files. The mount command requires root access and will usually be performed by a system administrator. The NFS team will work with customer system administrators to set up the appropriate parameters for the mount. Once the mount is included in the mount table, it will be done automatically at boot time from then on and will look and act like a local filesystem. When required, we will also make sure customer filesystems are mounted on the Crays, Cluster, or other ICN hosts.

What about secure computing?

The NFS team has purchased servers for the secure partition. The Security Plan has been approved by the DOE and the NFS team is in the process of getting the Security Test Plan approved and executed. Full availability is targeted for December 1, 1995. Services on the secure NFS servers will be similar to those on the open NFS servers.

What code conversion is needed to take advantage of the NFS server?

NFS looks and acts like a local filesystem. Codes that utilize local filesystems require no change because files are accessed in the same manner as local files. Codes that utilize CFS (Common File System), must be converted to UNIX I/O. Some customers have chosen to add UNIX I/O and retain CFS I/O and tell the code which call to make at run time.

What kind of user support is available?

Users of the NFS servers can receive support through the ICN Consulting Office at (505) 667-5745. Additionally, the NFS team can be contacted by e-mail for questions or problems at nfs@lanl.gov.

The NFS Team: Christina Mercier, Denise Richards, and Lyn Kendrick
Storage Group (CIC-11)

Sun F77 (and ld): A User's Notes and Helpful Hints

This article contains helpful notes for using the F77 compiler (and the loader, `ld`) on the Suns.

F77 Notes

1. Examples of F77 execute lines that work.

   a. Compile only, with verbose turned on.

```
f77 -c -g -i4 -time -v pgm.f
```

   The `-c` is for compile only (`a pgm.o` object file is created),
   the `-g` option generates a symbol table,
   the `-i4` option makes all integers 32-bits long (default),
   the `-time` gives you the time for each step, and
   the `-v` turns on verbose mode.

   b. Compile and load without libraries (no verbose).

```
f77 -g -i4 -M -o testabs pgm.f
```

   The `-M` option generates a terribly simplistic, almost worthless load map, and
   the `-o` option names the executable (otherwise the name is `a.out`).

   c. Compile and load a subroutine or program to be used with an existing object file (like a set of `*.o` files).

```
f77 -g -i4 -M -o testabs pgm.f myobjs.o

f77 -g -i4 -M -o testabs sub.f *.o

f77 -g -i4 -M -o testabs pgm.f myobjs.o -L/dir/subdir -linp -lV77
```

The first example uses a set of subroutines `myobjs.o` that were compiled earlier (but the subroutines must have been compiled with the same options as in the current compile, otherwise you get a "segmentation fault" when you try to execute `testabs).`

The second example assumes that you have already compiled a set of subroutines (the `*.o)` and that you want to fix `sub.f` and link it with the existing compiled subroutines (each subroutine is in a separate `.f` file).

The third example compiles and loads a code with one existing set of objs, one user library (a `.a` file that can be found in the directory specified by the `-L` option), and one system library (V77 is the VMS Fortran library). Again, it is very important that all the routines in `myobjs` and user library `libinp.a` (the system convention for library names) be compiled with exactly the same compiler options that you are currently using for `pgm.f`. The user library `libinp.a` must have been built using `ar` and named `libinp.a.`

d. Load only (previously compiled objects).

```
f77 -M -o testabs pgm.o myobjs.o inplib.o -lV77
```

In this example, I used an object file containing the user library routines in `libinp.a` instead of specifying a `-L` option and a `.a` file. The order of objs is important. If you have a routine in more than one `.o` file, the loader will complain and you won't get an executable.

2. What you need to know about unsatisfied externals.

a. Your code will not work if you have any unsatisfied externals, even if you never call them. UNICOS has a smart loader that lets you run with unsatisfied externals (unless you specify otherwise). The `ld` execute line has an argument "-assert nodefinitions" which may let you run with unsatisfied externals, but I could never get F77 to pass the option to `ld` correctly, and (as explained below under Loader Notes) I could never run `ld` by itself.

b. Create dummy routines or "comment out" calls to non-existent subs.

3. A few words about Fortran and C preprocessors.

a. If you create a `*.F` file (capital f), F77 will automatically call the precompiler CPP to fix `includes.` The input library subs are `.F` files (with `#include inp.h`, starting in column 1). I chose to use the F77 `include` statements, which do not need CPP. Plain Fortran77 `include` statements begin in column 7 in fixed format.

b. CPP not only allows `include` statements but `ifdef` statements and other features. Preprocessing with CPP may be preferable to preprocessing with F77 if you have a large program or if you port your codes to several platforms.

4) A warning about Fortran errors.

If you have a file with more than one subroutine in it and you get a Fortran error in one of the subs, don't be surprised if the compiler proceeds to flag many errors in subsequent subs on that file. Just correct the first error encountered and run F77 again. For some reason the compiler gets into some error mode once it encounters one compiler error.

Loader (`ld`) Notes

1. I was unable to run `ld` by calling it directly. I was able to load only by running F77. I think the reason the loader didn't work for me may have to do with the specification of all the other libraries the system uses and all the other options that are automatically set by F77. If you compile and load a simple `.f` file with F77 and specify the verbose option to F77, you get an idea of how you need to run `ld` by looking at the lines following `ld_library_path` and at the lines following `ld` options.

2. Use of user-defined libraries

a. I could never get the `-L/dir/subdir1/subdir2` to search for routines that were not in the current directory. The `-L` option works just fine, but not the way I was using it. This is important to know if you want to use user-defined "libraries" with names like `inp.lib.` For `ld` to pick up this file, a `.a` file should have been created using F77 and `ar`, and it should have been named `libinp.a.` The third F77 execute line in section 1c above could then be used to link with subs in `libinp.a.`

b. To use input library subs in our file `inp.lib,` I used F77 to create an object file i`nplib.o.` I then used the F77 execute line in section 1d above to link with the subs in `inplib.o.`

3. I tried to create an executable that had unsatisfied externals by using the "-assert nodefinitions" option. That didn't work in `ld` and F77 doesn't like it either so just eliminate your unsatisfied externals.

4. As mentioned above, you can't have more than one routine with the same name. This is a problem if you use a "library" like `inp.lib` because it has a primitive version of the routine `fanout` that is supposed to be replaced by your own (better) `fanout`. I had to delete `fanout` from the input "library" `(inp.lib)` to get the loader to work.

Scripts

1. I got tired of typing all the options to F77 so I created a simple script file named `f77jcl`, and I did a `"chmod utx f77jcl"` to make the file executable. The `f77jcl` file is listed below.

```
#     !/bin/csh

#     Script with examples on how to compile and load.
#     Created by John M Romero in March, 1995
#     Modified July 14,1995 11:24 am by JMR
#     Last Modified July 17, 1995 4:25 pm by JMR
#      To add "compile and load" with fix.

#     Compile only (verbose).
#     f77 -c -g -i4 -time -v $1

#     Compile and load without libraries, with load map (no verbose).
#     f77 -g -i4 -lV77 -M -o testabs $1

#     Compile and load, fixing one sub and using VMS Fortran library.
#     f77 -g -i4 -o linkcode $1 *.o -lV77

#     Compile and load with one user defined library (libinp.a under
#     path specified by -L option) and one system library (libV77.a).
#     f77 -g -i4-M-L/home/newcastle/sww/jlk/inp -o abs $1 -linp -lV77
```

2. To use the above script, "uncomment" the appropriate F77 line and supply an argument (only one). The execute line looks like

```
f77jcl subx.f
```

3. To efficiently do the job of compiling, loading, testing, fixing specific routines and then recompiling, reloading, retesting, etc., you should use a `makefile` if you have a code that has many subroutines. The discussion of "makefiles" is beyond the scope of this simple article. If you want to use makefiles, get an expert to help you construct a simple makefile that meets your specific requirements.

Acknowledgments

I am indebted to John Turner of XTM for his help in explaining the loader options and conventions and for his construction of a simple makefile to make my work easier. John also made many helpful comments to the earlier version of this article. I also want to thank Bob Boland of CIC-8 for his help with F77. Happy compiling/loading in our brave new world.

Please contact the ICN Consulting Office (consult@lanl.gov or 667-5746) with your questions and comments about this article.

John M. Romero, XHM

MASS Installed on the IBM Cluster

Mathematical Acceleration SubSystem (MASS) Version 1.0 is a set of subroutines for computation of mathematical functions that may provide improved performance for certain Fortran and C intrinsic functions over those in the conventional IBM libraries. MASS is the result of software technology developed by IBM Research. It runs under AIX version 3.2 or higher and optionally replaces a subset of the subroutines in the library presently shipped with the Fortran and C runtime environments. MASS Version 1.0, described below, runs on all models of the IBM RISC System/6000 and the IBM Power Parallel SP1 and SP2 systems, using processors from the POWER, POWER2, and PowerPC families.

What is in MASS Version 1.0?

MASS Version 1.0 contains a select set of the more important math intrinsic functions in the AIX system library libm.a. The MASS library is named libmass.a and contains sqrt, rsqrt, exp, log, sin, cos, tan, atan, atan2, sinh, cosh, X**Y. The libmass.a library can be used with either Fortran or C applications. It assumes that the IEEE rounding mode has been set to "nearest" and that exceptions have been masked off. In some cases MASS is not as accurate as the system library, and it may handle end-point cases differently from libm.a (sqrt(inf) for example). The trig functions (sin, cos, tan) return NaN (not a number) for large arguments (abs(x)>2**50*pi).

Sample Performance and Accuracy Data for MASS

Table 1 (see page 22) contains sample performance data for three different models of the RISC System/6000—Model 250, Model 550, and Model 590. The data should be considered approximate. It was obtained by timing many repetitions of a loop over 10,000 random arguments and includes all overhead. Performance may deteriorate for arguments at or near the end-points of the valid argument range. The Model 590 has a hardware sqrt which is not timed here. The user may experience performance which varies from that found in this table.

Table 2 (see page 23) contains sample accuracy data for the libm.a and libmass.a libraries. The numbers are based on the results for 10,000 random arguments chosen in the specified ranges. The real*16 functions were used to compute the errors. There may be portions of the valid input argument range for which accuracy is not as good as illustrated in the table. Also, the user may experience accuracy which varies from the table values when argument values are used that are not represented in the table.

How to Use the MASS Version 1.0 Library

To use libmass.a, use -lmass before libm.a in the linker command line. For example, if the library is installed in the customary location in directory /usr/lib, then the command lines for Fortran and C would be

```
xlf progf.f -o progf -lmass
cc progc.c -o progf -lmass -lm
```

Fortran links with libm.a automatically, so only -lmass needs to be specified on the command line. For C code, you must link both libmass.a and libm.a, since libmass.a only includes a subset of the functions in libm.a. The library uses some global names for shared tables. These names have the form %...$.

When called from C code, the functions in libmass.a do not set the global variable "errno" to indicate range, domain, or loss-of-precision errors. For example, with libm.a, sqrt(-1) returns the value NaN and also sets errno to 33 (EDOM—domain error); with libmass.a, sqrt(-1) simply returns NaN, but errno is not set.

Selective Use of MASS Version 1.0

If you wish to use libmass.a for some functions and the normal libm.a for the remainder, you can use an export list with the ld command. For example, to select only the fast tangent routine from libmass.a for use with a C program sample.c:

1. Create an export list containing the names of the desired functions. In this case, the file export.list will contain only two lines:

```
#!
.tan
```

(Note: remember that Fortran names start with "._" while C names start with start with ".".)

Table 1. Math Function Performance (Cycles per Call)

Function	Range[a]	libm.a			libmass.a			Ratio		
		250[b]	550	590	250	550	590	250	550	590
sqrt	A	112	57	45	64	35	32	1.75	1.63	1.40
rsqrt	A	109	60	43	66	37	33	1.66	1.62	1.31
exp	D	114	63	53	60	30	22	1.89	2.12	2.44
log	C	163	79	56	70	37	36	2.33	2.11	1.57
sin	B	91	39	31	41	22	18	2.23	1.79	1.72
sin	D	137	56	47	90	44	38	1.52	1.28	1.24
cos	B	94	40	32	41	21	19	2.29	1.88	1.71
cos	D	135	56	47	90	44	36	1.51	1.29	1.29
tan	D	208	108	90	98	44	38	2.12	2.46	2.39
atan	B	74	50	41	79	41	37	0.93	1.23	1.13
atan	D	135	75	63	118	63	57	1.15	1.19	1.11
sinh	D	275	201	184	94	42	31	2.93	4.74	5.91
cosh	D	216	151	135	77	35	27	2.82	4.25	4.95
atan2	B	613	471	401	145	90	73	4.24	5.25	5.46
x**y	C	394	198	161	168	75	66	2.34	2.63	2.43

[a]Range Key

A = 0, 1
B = -1, 1
C = 0, 100
D = -100, 100

[b]Cycle times

250 15 nanoseconds
550 24 nanoseconds
590 15 nanoseconds

Table 2. Math Function Accuracy

	libm.a		libmass.a		
Function	Range[a]	PCR[b]	MaxE[c]	PCR	MaxE
sqrt	A	100.00	0.50	95.86	0.62
rsqrt	A	88.52	0.98	97.91	0.57
exp	D	99.95	0.50	96.55	0.63
log	C	99.99	0.50	99.69	053
sin	B	81.31	0.91	96.88	0.80
sin	D	86.03	0.94	83.88	1.36
cos	B	92.95	1.02	92.20	1.00
cos	D	86.86	0.93	84.19	1.33
tan	D	99.58	0.53	64.51	2.35
atan	B	99.92	0.51	92.58	1.78
atan	D	99.98	0.50	98.86	1.72
sinh	D	94.78	1.47	89.54	1.45
cosh	D	95.64	0.97	92.73	1.04
atan2	B	74.14	1.26	85.70	1.72
x**y	C	99.95	0.50	96.87	0.62

[a]Range Key

A = 0, 1
B = -1, 1
C = 0, 100
D = -100, 100

[b]PCR = Percentage correctly rounded

[c]MaxE = Maximum observed error in ULPS

2. Pull the exported routines into an object file using the load command with libmass.a:

```
ld -o fast_tan.o  -bE:export.list -lmass
```

or, if libmass.a is not in /usr/lib,

```
ld -o fast_tan.o -bE:export.list -L/some/other/path -lmass
```

3. Create the final executable using cc, specifying fast_tan.o before the standard math library, libm.a. This will link only the tan routine from MASS (now in fast_tan.o) and the remainder of the math subroutines from the standard system library:

```
cc -o sample fast_tan.o -lm
```

(Note: This scheme will work for all routines in libmass.a except sin, cos, atan, and atan2. These routines are coded together, so selecting fast sin will also link in fast cos; selecting atan will also link atan2.)

For further information about MASS, please contact the CIC Customer Service Center at (505) 665-4444 or cichelp@lanl.gov.

Bob Boland, wrb@lanl.gov, (505) 667-1729
Distributed Computing Group (CIC-8)

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IBM

Utilizing Attachments with Eudora PC

Here are instructions on how to send and receive attachments, how to send them so others can read them without leaving Eudora, and how attachments can automatically be deleted. These instructions apply to Eudora commercial version 2.OX for PCs. (For information on using Eudora for Macs refer to the May '95, July '95, July '94, and August '94 issues of BITS.)

Have you ever wanted to send a WordPerfect document through e-mail but realized that when sent, all the bolding, underlining, and graphics that made the document unique were gone? With Eudora you can mail your documents as attachments using MIME and they'll arrive at your destination looking just as nice as they did on your PC.

What is MIME?

The acronym MIME stands for Multipurpose Internet Mail Extensions. It allows you to send documents from various software applications through electronic mail while retaining all the bolding, underlining, and graphics by encoding the messages. MIME also tells Eudora what type of data is in the mail. By using MIME to send documents, you can send them in their original format with confidence that they will arrive at their destination intact.

Sending Attachments

Before sending an attachment, make sure your Eudora configuration is correct. On the Eudora menu bar, click on "Special" and move your cursor down to "Switches." Under the "Send Attachments" section, make sure the box next to "Always as Attachment" has an "X" in it (if it does not, just click on the box). Also, make sure that "Encode With" is set for "MIME" (just click on the circle next to "MIME"). Then click "OK" to save your changes. Because these switches have to do with your Eudora configuration, you must close out Eudora and then open Eudora again to activate the changes (you do not have to close out Windows).

Now create a mail message as you normally would. Move your cursor into the text section of your mail message. On the Eudora menu bar, click on "Message" and move your cursor down to "Attach Document." Select the document you would like to send by clicking on the drive letter (for example, C: or L:) and then the appropriate directories until you find your file. Once you have selected the filename, click "OK." Under the header information at the top of your memo, the path of the file will be listed in the "Attachments:" field. You will not see the message displayed as part of the text.

Attachment Etiquette

It is always nice to let the person receiving the document know a little bit about the document you are sending. In the text of the message, describe the attachment. For example, "This is a copy of the August 1994 budget report." You can also let the recipient of your message know how you created the document. For example, "This is a WordPerfect 6.1 document created on a PC."

Its also a good idea to keep the default extension of the filename. The extension is the three letters following the period in a filename. The extension in the filename "report.wpd" is "wpd." If you keep the default extension given by the application package, (providing the addressee also has that package) the addressee will be able to read the document without having to leave Eudora. The default extension for WordPerfect documents is .wpd.

Send your message and off it goes along with the attachment. Don't worry—your original file is still with you. You merely sent a copy of the file.

Receiving Attachments

The easiest way to receive an attachment is to automatically have it placed in a directory when you receive it. To do this, click "Special" on the Eudora menu bar and move your cursor to "Configuration." Under the "Message Configuration" section, make sure the "Auto Receive Attachment Directory" box has an "X" in it. Then click on the shaded area to the right and select a directory on your C: drive where you would like your attachments to be stored. Click on "Use Directory." The directory will be listed in the shaded area. Click "OK" to save the changes. Because these switches have to do with your Eudora configuration, you must close out Eudora and then open Eudora again to activate the changes (you do not have to close out Windows).

You will know you received an attachment when you look at your "In" box listing. In the first column you will see an icon that looks like a sheet of paper. This is to let you know the message contains an attachment. Double-click on the message as you normally would to read it. At the very bottom of the text of the message you will see the line "Attachment Converted" with the path of where the document was placed on your PC. Place your cursor anywhere on the "Attachment Converted" line. If you have the same software package as the person who created the attachment, the software package will automatically be opened or "launched" and you can read the message without having to leave Eudora. For example, if you receive a .wpd attachment and you have WordPerfect, double-click on the "Attachment Converted" line and WordPerfect is launched and the attachment file is automatically opened for you. If the extension is .txt, your Notepad in Windows will open so you can read the attachment. If you do not have the same application as the person sending the message, you will need to open a similar application (if it is a word processing document, open your favorite word processing application) and then open the file as you normally would. Your application will attempt to convert it for you.

Automatically Deleting an Attachment with the E-mail

You can automatically delete the attachment when you delete the mail message in Eudora. But be careful! The attachment will still be on your PC when you put the e-mail message in the "Trash" folder. When you "Empty Trash," however, the attachment will be deleted from your PC. To set Eudora to automatically delete the attachment when you delete the mail message, click "Special" and then "Switches" in the Eudora menu bar. Under the "Miscellany" section, click "Tidy Attachment Dir." Then click "OK" to save your changes. Because these switches have to do with your Eudora configuration, you must close out Eudora and then open Eudora again to activate the changes (you do not have to close out Windows). If you want to save the attachment, you must move the file to a directory other than the one where your attachments are automatically received.

Amy Meilander, amy@lanl.gov, (505) 665-0392
Desktop Group (CIC-2)

LANL Research Library Training

The LANL Research Library provides training for using its specialized databases. Training sessions begin at times indicated below. Classes are scheduled for half an hour, except for "Information Resources on the Internet via WWW" which is two hours. Space is limited to 8 per session. Classes are free, but you must pre-register by calling the Research Desk at 7-5809 or sending e-mail to ref@lanl.gov. Special classes and orientations can also be arranged.

Date	(Time)	Subject Matter
10-3-95	(1:00 p.m.)	Science Citation Index (WWW version)
10-5-95	(10:00 a.m.)	Info Sources on the Internet via WWW (Gopher searching upon request)
10-12-95	(1:00 p.m.)	Commercial Information for Patent Applications
10-12-95	(2:00 p.m.)	Info Sources on the Internet via WWW (Gopher searching upon request)
10-18-95	(11:00 a.m.)	MELVYL (U of CA specialized databases)
10-19-95	(10:00 a.m.)	Info Sources on the Internet via WWW (Gopher searching upon request)
10-26-95	(1:00 p.m.)	Science Citation Index (WWW version)
10-26-95	(2:00 p.m.)	Info Sources on the Internet via WWW (Gopher searching upon request)
10-31-95	(1:00 p.m.)	Commercial Information for Patent Applications

Lab-Wide Systems Training

The Customer Service Group (CIC-6) offers training for users of Laboratory information systems. The CIC-6 courses offer training for a variety of personnel including property administrators, group secretaries, training coordinators, budget analysts, group leaders, or anyone needing to access training records, property records, costs, employee information, travel, chemical inventories, etc. Refer to the table below and on the following pages for specific information about courses currently offered.

Course Registration

You must have a valid ICN password before taking any of the courses shown in the table. To register for a course, call CIC-6 Training, Development, and Coordination section at 667-9444. You will be sent a registration form to be completed and returned.

Course Title	Date	Time	Cost	Course Number
Automated Chemical Inventory System (ACIS):	**Scheduled Upon Request**		**$260**	**Course #7480**
	Participants receive hands-on instruction to update the status (end-user,location, quantity) of chemical containers. Participants will also learn to generate chemical inventory reports by chemical name, end-user, location, and organization.			
Budget Computing System (BUCS):	**Scheduled Upon Request**		**$260**	**Course #3527**
	This training is an introduction to the Budget Computing System (BUCS). Students practice generating "quick reports" and reports requiring parameter files. An introduction and demonstration of (no "hands-on") allocating and forecasting procedures are given during the three-hour session.			
Directory Information System (DIS):	**Scheduled Upon Request**		**$260**	**Course #7072**
	Lab-wide customers responsible for maintaining the Laboratory directory in the Employee Information System will receive hands-on instruction to update Laboratory employees, update and add non-Laboratory employees, retrieve location and address information for any employee, and print reports.			
Employee Development System - Basic Training (EDS I):	**10/11/95**	**8:30 – 12:00**	**$260**	**Course #5289**
	The course provides hands-on instruction to request course enrollment, use the on-line course catalog, retrieve training transcripts, and assign EDS authorities. The student will learn to create courses, add students to the courses, and generate several training reports.			
Employee Development System - Training Plans (EDS II):	**10/25/95**	**8:30 – 12:00**	**$260**	**Course #7155**
	Participants receive hands-on instruction to create and maintain training plans, assign assignment codes, and generate training plan reports. Attendees must have prior training in the Employee Development System (course #5289).			
Eudora Electronic Mail	**10/26/95**	**8:30 – 12:00**	**$130**	**Course #9762**
	This class is a hands-on class that teaches the participant how to use Eudora software to create, send, receive, and edit electronic mail messages. In addition to these procedures, the participant will learn what related settings mean and how to configure the system to meet his or her individual needs.			
Financial Reporting System	**10/17/95**	**1:15 – 4:45**	**$260**	**Course #11050**
	Students will receive hands-on training to generate standard financial reports and make on-line queries from information in the "data warehouse," a collection of data from Laboratory budgeting and accounting systems. The new ad hoc reporting function will be demonstrated.			

Scheduled Upon Request **$260** **Course #6996**

Lab-wide users with a need to view the status of work orders and tickets in their organizations will receive hands-on instruction to request, print, and review work order, ticket and project summary information reports.

Scheduled Upon Request **$260** **Course #8338**

Participants receive hands-on instruction to "explode" and "transfer" through the costs, allocations, and outstanding commitments screens. In addition, participants will create/review reports, access the Information Manager Utility for printing reports, and learn how to assign authorities in the system.

Scheduled upon request **$260** **Course # 7907**

Participants receive hands-on instruction to create, update, and print the non-RAM Hazardous Materials Transfer Form (HMTF). Attendees must have completed "Completing the HMTF for Non-RAM," course #7512, sponsored by HS-8.

Scheduled Upon Request **$260** **Course #7993**

Participants receive hands-on instruction to create, update, and print the Radioactive Materials Transfer Form (RMTF). Information about the non-RAM Hazardous Materials Transfer Form (HMTF) is included. This course is appropriate for people who fill out both RAM and Non-RAM forms. Attendees must have completed "Completing the RMTF," course #7517, sponsored by HS-8.

10/18/95 **8:30 – 10:30** **$130** **Course #10961**

Students gain basic understanding of the Internet and the World Wide Web and the use of Netscape as a browser to surf the Net. Topics covered are both Laboratory sites and open sites, along with practical uses of the Internet.

Course Title	Date	Time	Cost	Course Number
Facilities Project Information/Work Orders (FPI/WO):	**Scheduled Upon Request**		**$260**	**Course #6996**
	Lab-wide users with a need to view the status of work orders and tickets in their organizations will receive hands-on instruction to request, print, and review work order, ticket and project summary information reports.			
Financial Management Information System (FMIS):	**Scheduled Upon Request**		**$260**	**Course #8338**
	Participants receive hands-on instruction to "explode" and "transfer" through the costs, allocations, and outstanding commitments screens. In addition, participants will create/review reports, access the Information Manager Utility for printing reports, and learn how to assign authorities in the system.			
Hazardous Materials Transfer Tracking System for Nonradioactive Material (HMTTS/NRAM):	**Scheduled upon request**		**$260**	**Course # 7907**
	Participants receive hands-on instruction to create, update, and print the non-RAM Hazardous Materials Transfer Form (HMTF). Attendees must have completed "Completing the HMTF for Non-RAM," course #7512, sponsored by HS-8.			
Hazardous Materials Transfer Tracking System for Radioactive Material (HMTTS/RAM):	**Scheduled Upon Request**		**$260**	**Course #7993**
	Participants receive hands-on instruction to create, update, and print the Radioactive Materials Transfer Form (RMTF). Information about the non-RAM Hazardous Materials Transfer Form (HMTF) is included. This course is appropriate for people who fill out both RAM and Non-RAM forms. Attendees must have completed "Completing the RMTF," course #7517, sponsored by HS-8.			
Introduction to the Internet: Beginning Netscape	**10/18/95**	**8:30 – 10:30**	**$130**	**Course #10961**
	Students gain basic understanding of the Internet and the World Wide Web and the use of Netscape as a browser to surf the Net. Topics covered are both Laboratory sites and open sites, along with practical uses of the Internet.			
Introduction to LANL Information Systems	**10/20/95**	**8:30 – 11:30**	**Free**	**Course #10118**
	This three-hour class is a hands-on introduction to the information systems available to Laboratory-wide users. The participants will become acquainted with Lab-wide information systems such as TRIPS and Stores, Electronic Mail, and Netscape (an interface to Laboratory information).			
Key/Core System	**10/24/95**	**1:30 – 3:30**	**$130**	**Course #10179**
	Key custodians and alternate key custodians receive hands-on instruction to add, update, and delete key and padlock information, and view assignment information and request reports. Students will also learn how to request key inventory notifications. Students must be a key custodian or alternate and have an ICN password.			
Lotus Notes Basic Concepts	**Scheduled Upon Request**		**$260**	**Course #9917**
	This class provides hands-on instruction for Mac and PC users to use Lotus Notes software to create and send E-mail memos; fax documents; search databases; create filters, nicknames, banners, and doclinks; set defaults; and use multiple address books. In addition, participants learn how to use the memo, meetings, and discussion databases.			
On-Line Forms	**10/19/95**	**8:30 – 10:30**	**$130**	**Course #9756**
	Participants will learn to use Netscape software to access Lab-wide information and forms. Using Jetform Filler software, participants will access, complete, and print forms such as the "ICN Validation Request," "Visitor Request for Unclassified Visits to Security Areas," and "Request for Quotation."			

Course Title	Date	Time	Cost	Course Number
Property Accounting, Inventory, and Reporting System (Advanced)	**Scheduled upon request**		**$260**	**Course #9918**
	This course will include a refresher of PAIRS, advanced techniques and tips, explanation of the notification system, and report capabilities. Swap Shop, Loan Out information, and support tables will be discusses. Participants should already have a basic understanding of and know how to use PAIRS.			
Secretarial/Contract Services (SE):	**Scheduled upon request**		**$260**	**Course #7481**
	This class provides hands-on instruction for creating secretarial requests for temporary services, entering time for technical and nontechnical contract employees, and creating reports using the Information Manager Utility. The students will also learn how to review notifications and approve attendance. A training database will be used for the class.			
Signature Authority System (SAS):	**10/12/95**	**8:30 – 12:00**	**$260**	**Course #7582**
	Managers or their designees receive instruction to assign, view, and change signature authorities (purchase request, chemical purchase, and handling hazardous material). Participants will also learn how to generate and print authority reports for their organizations.			
Time and Effort System	**10/17/95**	**8:30 – 12:00**	**$260**	**Course #11018**
	The student will learn how to enter attendance, amend attendance, approve attendance, and submit exception and approval reports. Time codes and associated policies will also be discussed. In addition, the student will learn how to use the Information Manager utility to view and print reports.			
Travel Reporting Information Planning System (TRIPS):	**Scheduled upon request**		**$260**	**Course #4369**
	Class participants receive hands-on instruction to prepare travel requests (TRs) on-line and learn the print, revise, and cancel options. The participants also learn how to use the on-line approval function. The various reports available in TRIPS-II are reviewed.			

CIC Computing Classes

CIC offers a variety of computing courses for the professional development of Laboratory employees. The courses listed in Table 1 will meet at the time and the date shown. The date for courses in Table 2 are not known at this time.

Course Registration

To register: (1) check the box beside the appropriate course, (2) complete the Enrollment Information section below, and (3) follow the mailing instructions on the back of this form. Submittal of a Course Registration form does not guarantee participation in an advertised class, but it is the only way to get into the queue for notification of upcoming classes. Classes are conducted in a secure area unless noted; uncleared participants require escorts. Call the Training Coordinator at 667-9399 for more information.

Table 1 Courses with confirmed time and date

	Course Title	Instructor	Cost	Dates
☐	UNIX (Beginning)	Ted Spitzmiller & Jeffrey Johnson	$810	10/23/95 through 10/27/95

Table 2 Courses with date to be arranged (TBA)

	Course Title	Instructor	Cost	Dates
☐	C Programming (Beginning)	Boulder Software Group	$1025-$1450 (depending on enrollment)	TBA (5-day class)
☐	C Programming (Advanced)	Boulder Software Group	$1025-$1450 (depending on enrollment)	TBA (5-day class)
☐	Common Object Request Broker Architecture (CORBA)	CORBA expert	$1000.00-$1500.00 (depending on enrollment)	TBA
☐	Parallel Programming Workshop for the PowerParaellel (SP2) System (IBM)	IBM System Administration Expert	$1250.00 – $1750.00 (depending on enrollment)	TBA
☐	SUN Solaris 1.X (SunOS 4.X) Advanced System Administration	Sun Microsystems Expert	$1750-$2000 (depending on enrollment)	TBA (4.5-day class)
☐	SUN Solaris 2.X System Administration	Sun Microsystems Expert	$1750-$2000 (depending on enrollment)	TBA (5-day class)
☐	Unigraphics	Polster CAD/CAM Services or comparable expert	$1067.67–$1250.00 (depending on enrollment)	TBA

Note: Detailed course descriptions for most classes provided on the following pages.

cut along dashed line

Enrollment Information

Name _____

Phone _____ Z-Number _____

Group _____ Mail Stop _____

Program Code* _____ Cost Code* _____

Group Leader Signature _____

****Enter program code and cost code for all courses. If you need to withdraw from a class fewer than 5 working days before the class is scheduled to begin, your group will still be charged. Substitutes may be sent, but please let the CIC Division Training, Development, and Coordination Office (667-9399) know who your substitute will be.***

Do Not Staple
Fold on This Line First

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 88 LOS ALAMOS NM

POSTAGE WILL BE PAID BY THE ADDRESSEE

MAIL STOP B296
CIC DIVISION TRAINING DEVELOPMENT
AND COORDINATION TEAM
LOS ALAMOS NATIONAL LABORATORY
PO BOX 1663
LOS ALAMOS NM 87544-9916

Do Not Staple, Seal with Tape
Fold Here

C Programming (Beginning)

Prerequisite: An understanding of the useful skills in a high-level programming language.
A current ICN password is required.

Location: CIC-Division Classroom, TA-3, SM-200, Room 210 (secure area).

Enrollment: Minimum 10, Maximum 16.

Topics: Introduction and Fundamentals; Basic Semantic Constructs—Getting Started; Base Level I/O with C; The Preprocess-Compilation Environment; Operators, Data Types, and Storage Classes; Control Flow Constructs; Conditional Constructs; Higher-Level Data Constructs in C; File I/O; UNIX Software Tools; and POSIX System Calls.

C Programming (Advanced)

Prerequisite: Useful skills and experience with the C Programming language.

Location: CIC-Division Classroom, TA-3, SM-200, Room 210 (secure area).

Enrollment: Minimum 10, Maximum 16.

Topics: Data Structures, Algorithms, and OOP; An Advanced Clinic for C Programmers; The ANSI C Recommendation X3.159; C and ANSI C War Stories; The Data Structure and the Assessment of Algorithms; Arrays; Structures; Unions; Stacks; Queues; Linked Lists; Recursive Functions; Binary Trees; Hashing; File Organizations Using the C Runtime Library; Standard Interprocess Communication Mechanisms; An Introduction and Overview of AT&T's C++ 3.0; and Appendix: references for periodicals, journals and texts.

Common Object Request Broker Architecture (CORBA)

Prerequisite: Familiarity with client/server environment; distributed, integrated applications; and object oriented technology tools.

Location: CIC-CTI Classroom; TA-3, SM-200, Room 115.

Enrollment: Minimum 10, Maximum 16.

Audience: Individuals interested in developing distributed, integrated applications using the CORBA software.

Topics: CORBA (A strategic overview, CORBA as a strategy, CORBA as a standard, CORBA as a development tool); The future of CORBA (CORBA/OLE interoperability, ORB interoperability, CORBA services, CORBA facilities); Technical introduction to CORBA (Components of CORBA, Worked Examples Using CORBA: Stubs (Static Invocation Interface), CORBA/OLE interoperability, CORBA and databases, CORBA and fault tolerant computing); ORB interoperability; Universal Networked Objects (UNOs); Internet Interoperability Protocol (IIOP); The Dynamic Skeleton Interface (DSI); and Bridges.

Parallel Programming Workshop for the PowerParallel (SP2) System (IBM)

Prerequisite: No prior knowledge of parallel programming required; some development experience in UNIX and in at least one of Fortran, C, or C++ is required.

Location: CIC-CTI Classroom; TA-3, SM-200, Room 115.

Enrollment: Minimum 10, Maximum 16.

Topics: Introduction to Parallel Programming (Definitions, Parallel Architectures and Algorithms, Parallel Programming Approaches, Program Partitioning and Mapping, Important Issues, Applications); SP2 System Overview; SP2 Parallel Environment (Overview, Compilers, Resource Management - partition manager, Parallel Program Visualization, Profiling Parallel Programs, Message Passing Library (MPL)); Parallel Virtual Machine Extended (PVMe); Parallel Programming Workshop (predetermined labs of varying difficulty; in language of choice); and Optional Topics (Parallel Databases, Parallel I/O).

Unigraphics

Prerequisite: Drafting terminology and skills, do not need to know Unigraphics CAD/CAM but must be familiar with CAD/CAM concepts.

Location: CIC-CTI Classroom; TA-3, SM-200, Room 115.

Enrollment: Minimum 10, Maximum 16.

Audience: Engineers, technicians, and draftspersons who must work with CAD/CAM CAE systems to be able to share and modify information efficiently.

Topics Include: Getting Started; Features & Operations; Lines; Arcs & Circles; Edit Curve; Fillet & Chamfer; View; Layout; WCS; Layer; Swept Feature & Operations; Info; Form Features; Transform; More Curve Creation & Object Display; Edit Feature; Overview of Sketches; Preferences; Sketch; Sketch Curves; Constraining Sketches; Swept Features Using Sketches; Editing Sketch; and Assemblies.

UNIX (Beginning)

Prerequisite: Familiarity with a UNIX workstation.

Location: CIC-Division Classroom, TA-3, SM-200, Room 210 (secure area).

Enrollment: Minimum 8, Maximum 10.

Topics: Overview of the Workstation environment; Getting Started; The UNIX File System; Manipulating Files; Customizing Your Environment; The C-Shell; Editing and Writing with vi; Using the Network; Discussing NFS and NIS; Using basic system status commands; Startup and shutdown procedures; Using tar.

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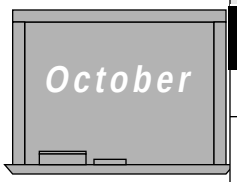

Schedule for Change Control

Date	Activity
October 3 (First Tuesday)	New or changed software is available in experimental (**X**) files on CFS for testing. This initial testing period is for uncovering problems in the software before the software is put into production. If you find a problem, please call the ICN Consulting Office at (505) 667-5746.
October 10 (Second Tuesday)	The changes become production version on • Machines **epsilon**, **rho,** and **zeta** (UNICOS) • Distributed processor **beta** (ULTRIX → AIX) • Distributed processor **ccvax** (VMS)
October 17 (Third Tuesday)	If no problems are reported to the ICN Consulting Office (505) 667-5746, changes are installed on • Machines **delta** and **gamma** (UNICOS)
STOP	The freeze on the secure ICN has been lifted. All backlogged changes have been installed. New changes will follow the secure ICN Configuration Management Plan before being installed.

Note: A stop sign in front of a title is significant:

STOP **= incompatible changes; please read!**

Editor's Note

Beginning with the February 1996 issue, ICNchanges will no longer be available in hard copy or published in the *BITS*: *Computing & Communications News*. Information about Change Control will continue to be available as it is today by linking to the following Web page:

http://www.lanl.gov/computer-information/ICNchanges

Please try this link and if you have any suggestions or comments contact Bob Ayars (DDCIC) at (505) 667-9047 or **rsa@lanl.gov**. After January 1, 1996 the changes will be announced by e-mail. If you want to be added to the Change Control e-mail list contact Barbara Ritchie at (505) 667-7275 or **bxr@lanl.gov** to be notified as changes become available on the Web.

Deletions

This section lists utilities and services that are targeted for deletion or have already been removed from the systems listed.

Stop BULLETIN UTILITY (BETA)

The **bulletin utility** will not be ported to the new BETA. The utility will no longer work to submit articles to the ICNchanges Change Control. You may either use the template included in the article submission deadline notice or you may retrieve the standard text template from CFS **/cc/sicnchg.tmp**.

Stop DELETIONS (UNICOS)

These tools are being removed from all UNICOS systems during the December 1995 Change Control cycle. For more details please see the Feature Articles section in this issue of *BITS*.

ARCHIVE
CGM Library
DEARCHIVE
MVI
RASVIEW
TOP
VT2HOST
VT2PC
VTOU

GAS — third party software — support will be available as noted on the **support** man page.

Changes

AUTOSUM (UNICOS)

Function

Retrieves accounting and utilization information from CCF accounting databases.

Change

Two new system-selection criteria, "adsm" and "nfs" have been added. The first refers to the charging records generated by the ADSM (Adstar Distributed Storage Manager) and the second to the records generated by the CIC Division NFS (Network File System).

The default display for the ADSM contains

adsm-reg	Number of one-time registration fees, currently $71.40.
nmachs	Number of machines for which monthly service charge assessed, currently $14/month/machine.
gb-month	Number of gigabytes stored for the month, currently at $2/gigabyte/month.

The respective keywords for display are "adsm-reg," "nmachs," and "adsmstor;" as mentioned, these are automatic if the default display is chosen.

The default display for the NFS contains

gb-month	Number of gigabytes stored for the month, currently at $35/gigabyte/month.

The keyword for this display option is "nfsstor;" again, this is automatic if the default display is chosen.

X File Access

On CFS as: **/ccx/unicos/bin8/autosumx** for Machines Gamma and Rho.
On CFS as: **/ccxs/unicos/bin8/autosumx** for Machine Zeta.
On CFS as: **/ccxs/unicos/bin7/autosumx** for Machines Delta and Epsilon.

Online Documentation

To display the man page (dated 10/95), enter: **man autosum**

COST (UNICOS)

Function

Produces a monthly summary of CCF charges for a specified user, group, program, division, or charge code.

Change

COST has added "adsm" and "nfs" to the list of systems examined for charges. "adsm" refers to the Adstar Distributed Storage Manager and "nfs" to the CIC Division Network File System.

X File Access

On CFS as: **/ccx/unicos/bin8/costx** for Machines Gamma and Rho.
On CFS as: **/ccxs/unicos/bin8/costx** for Machine Zeta.
On CFS as: **/ccxs/unicos/bin7/costx** for Machines Delta and Epsilon.

Online Documentation

To display the man page (dated 10/93) enter: **man cost**

To display the built-in help package, enter: **cost -h**

Stop PROD (UNICOS)

Function

PROD provides access to the ICN production system. It allows users to submit and monitor production (batch) jobs on Cray machines at Los Alamos.

Change

- The memory limit parameter is now in "megawords" (1024 X 1024 words) and is defaulted to 16 Mwords.
- Jobs needing more than 16 Mwords must specify an upper memory limit or they will be aborted when they exceed 16 Mwords.
- The maximum memory parameters for machines shown in the MACHINESTATUS command is in Megaword units.
- The HELP command is updated with current information.
- The job description parameter can now be any character string up to 20 characters except blanks unless double quotes (") are used.
- The RERUN parameter defaults to "no" instead of automatic.
- The TARGET parameter defaults to the submitting machine.
- For purposes of the TARGET parameter, machine names are abbreviated to their first letter.

X File Access

No experimental (**X**) files.
Since PROD is a distributed utility, Machines Delta, Epsilon, and Zeta will be updated on October 10, 1995.

Online Documentation

To display the man page (dated 10/95), enter: **man prod**

Network Services Information

This section provides information and a record of changes to the software and hardware that make up the ICN network and the services it provides. If you detect a problem, please call the ICN Consulting Office at (505) 667-5746, or send electronic mail to **consult@lanl.gov**.

Stop TYMNET

On October 31, 1995, **tymnet** will be canceled. If you still use Tymnet, there are several options for you to access the services you need.

Remote access to the Laboratory

From home, while on travel, or away from the Laboratory. CIC-4 now offers an 800 number that provides up to 28.8 kbit/s SLIP (Serial Line IP) as well as asynchronous access. The 800 number is: (800) 443-1461. When you log on you will be asked for a cost center and program code. Your charge code will be charged 17 cents per minute of connect time during fiscal year 1996 (was 22 cents per minute in fiscal year 1995). The 800 number will not accept calls from foreign countries. If your travel is out of the country, the best way to access Los Alamos would be to use a Lab calling card and dial one of the following numbers

(505) 667-9020, 9021, 9022, or 9023.

Stop TYMNET (Contd.)

These numbers provide the same service as the 800 number. A Lab calling card can be obtained by calling a CIC Customer Service Representative at (505) 667-3400.

The 800 number described above also provides access to the Internet and the services listed below.

Access to services outside the Lab

The following services that can be reached via Tymnet can now be reached via the Internet using the listed Internet address. Individual accounts on the listed services can be obtained from Library Services at (505) 667-5809.

Compuserve	compuserve.com
Dialog	dialog.com
LEXUS/NEXUS	lex.meaddata.com
MELVYL	melvyl.ucop.edu
WA ALERT	cqalert.com
RLIN	rlg.stanford.edu
OCLC	epic.prod.oclc.org
STN	stnc.cas.org
WESTLAW	westlaw.westlaw.com

If you need further help using or accessing the Internet, please contact Steve Howard at (505) 667-2051 or **sgh@lanl.gov**.

System Information

This section provides information and a record of changes to the ICN operating systems. When changes are announced here, they may already be included in the production versions of the indicated operating systems and machines. Most of the changes are strictly internal to the systems and should not affect users. However, if you detect a problem, please call the ICN Consulting Office at (505) 667-5746, or send electronic mail to **consult@lanl.gov.**

Stop Machine Rho (UNICOS)

A locally developed scheduler, “Opportunity Scheduling,” will replace Cray's Fair Share CPU scheduler on machine **rho** starting October 10, 1995. (The scheduler is that part of the operating system that decides which processes will be given CPU and memory resources.) Because Opportunity and Fair Share embody different scheduling policies, users may notice performance differences under the new system.

Stop Machine Rho (Contd.)

Under the Opportunity Scheduling process, the **nice** values reflect the relative importance (and thus service) of work within the resource group; please read the "New Scheduling System for UNICOS" article in the August 95 issue of BITS, and look for additional news articles on Machine Rho.

The **nice** value of 20 is no longer user setable. Users may alter nice values of interactive processes from their default of 30 down to a high priority of 21, or up to a low priority of 39.

The following Fair Share tools may fail to run, or may give deceptive results. Please use **inquiry -b** or **inquiry -bA** for comparable function.

shrates, shrinfo, shrstats, shrusage, shrview, shradmin, shrmon

Documentation

New and Updated Man Pages

The following online information has been added or updated.

UNICOS Man Pages

To access a UNICOS man page, enter: **man** *command_name*, where *command_name* is the name of the command, library, routine, or utility whose man page you wish to view.

Man Page	Description
prod	PROD provides access to the ICN batch production system. (NQS is not available to the user.) It allows users to submit, modify, delete, purge, abort, and obtain the status of jobs in the production system. PROD also allows users to examine the state of the scheduling queues, master queues, and production machines.
support	This is an index of software that is obtained from third party vendors and is made available on ULTRIX → AIX, UNICOS, or UNIX systems in the ICN. This software is not supported by CIC Division but rather by an individual referred to as the maintainer.

To create ASCII files of the UNICOS man pages, use the following command to remove the special characters for bold and underlining:

UNICOS 7.0 and 8.0: **man** *command_name* **| col -bx >** *filename*

Barbara Ritchie (**bxr@lanl.gov)**, (505) 667-7275
Communication Arts and Services (CIC-1)

Information About Change Control

ICN Change Control is the set of procedures that coordinates changes in the ICN to ensure quality control and smooth operation and to avoid introducing additional problems. In an environment as dynamic as the ICN, control must be imposed on the scope and timing of changes that involve many components. Please report any problems as soon as they occur by calling the ICN Consulting Office at (505) 667-5746.

The following CFS nodes are used for software that is maintained or announced through Change Control procedures. The files under **/ccx(s)/unicos** are deleted the last Friday of each month because these experimental versions become the production versions on all machines by the third Tuesday of the month. The other nodes keep the most recent versions of their respective software.

Non-UNICOS Systems	/*cc-node*/*platform*/*filename*
UNICOS Systems	/*cc-node*/**unicos**/*type*/*filename*

Where *cc-node* is:

ccx	Open change-control root node examples: **/ccx/mac/ppages** **/ccx/unicos/bin7/ppagesx** **/ccx/unicos/ubin7c/tedix** **/ccx/vax/ppages.bak**
ccxs	Secure change-control root node examples: **/ccxs/unicos/lib8/libcftlib.a** **/ccxs/sun/ppages.tar**

Where *platform* is:	Where *filenames* are:
aix	current executables for IBM RS6000-370 with AIX OS on Beta
alpha_osf	tar files for DEC Alpha OSF/1 machines
alpha_vms	backup save sets for DEC Alpha VMS machines
convex	tar files for Convex machines
dec_risc	tar files for DEC RISC workstations
dos	executables (**.exe**) for PC/DOS machines
hp	tar files for Hewlett-Packard workstations
ibm_rs6000	tar files for IBM RS6000 workstations
mac	binhex (**.hqx**) or MacBinary (**.mbin**) files for Macintosh computers
next	tar files for NeXT workstations
sgi	tar files for Silicon Graphics workstations
solaris	tar files for Sun Solaris workstations
sun	tar files for Sun OS workstation
ultrix	current executables to test on Beta (**ultrix** changing to **aix**)
unicos	executable **X** files or library files for current Change Control cycle
vax	backup-save-sets for VAX/VMS systems

Where *type* is:

bin#	binary files for version # of the operating system; note that an "x" is appended to the binary filenames
lib#	library files for version # of the operating system
u	user-supported executable files (**ex**, **ubin**, **ulib**, **udata**, **usys**)

If problems are discovered during the cycle, defective hardware or software is corrected, replaced, removed, or backed off.

Online Information

You can access complete online information about Change Control by linking to the following Web page:

http://www.lanl.gov/computer-information/ICNchanges

The Web page includes this menu:

Keyword Search of all ICNchanges (?)
Current (*month year*)
1995 Archives
1994 Archives
1993 Archives
1992 Archives
1991 Archives

Once you select a particular issue of ICNchanges, you then select which of these formats to use for viewing the articles:

BITS: ICNchanges - ASCII Version
BITS: ICNchanges - HTML Version
BITS: ICNchanges - Acrobat Version
BITS: ICNchanges - PostScript Version

You may contact the Customer Service Center at (505) 665-4444 or **cichelp@lanl.gov** for assistance.

*Barbara Ritchie (**bxr@lanl.gov**), (505) 667-7275*
Communication Arts and Services (CIC-1)

NOVEMBER DEADLINE

The deadline for articles for the November 1995 Change Control is 8:00 am, Monday, October 23, 1995. Please submit items to **bulletin@lanl.gov.**

CCF Machine Availability and Downtime

Machine Name(s)	Machine Type	Operating System	Security Partition	System Availability (August 1995)	Scheduled Downtime*
delta	CRAY Y-MP8/8-128	UNICOS 7.0	Secure	96.8	October 25 — 0400-0700
epsilon	CRAY Y-MP8/8-128	UNICOS 7.0	Secure	99.6	None
rho	CRAY Y-MP8/8-64	UNICOS 8.0	Open	95.4	October 11 — 0400-0700
zeta	CRAY Y-MP8/2-64	UNICOS 8.0	Secure	99.6	October 18 — 0400-0700
gamma	CRAY Y-MP/M98-82048	UNICOS 8.0	Open	99.0	October 18 — 0400-0700
tau**	CRAY T3D MC512-8	MAX 1.2	Secure	99.4	October 25 — 0400-0700
	CRAY Y-MP4I/464-2	UNICOS 8.0			
pi**	CRAY Y-MP EL92/1-256	UNICOS 8.0	Open	100%	
cluster	IBM Workstation Cluster	AIX	Open		
beta	VAX 6320 → IBM RS6000-370	ULTRIX → AIX	Open		
CCVAX	VAX 6410	VMS	Open		
OFVAX	VAX 6410	VMS	Open		
canyon	Thinking Machines Corp. CM-200	SunOS	Secure		
tres	Thinking Machines Corp. CM-200	SunOS	Secure		

* Additional downtime for the Cray machines may occur as a result of Network Dedicated Systems Time (NDST). The schedule for possible NDST is from 0600-0700 Mountain Time, Monday through Friday. Should NDST become necessary, a message listing the scheduled downtime will be broadcast on the applicable machines before the actual downtime occurs. For additional information contact the shift supervisor at (505) 667-4584. All times listed are Mountain Time.

** Access restricted.

Questions About Announced Changes?

Notice of all scheduled downtime will be broadcast on the machine before the downtime. For up-to-date machine status and scheduled downtime call: CCF Status Message (505) 667-5588.

Publication Information

ICNchanges Editor/Publication Coordinator
Barbara Ritchie (CIC-1)
Mail Stop B295
Telephone (505) 667-7275

Change Control Coordinator
Marjorie Sigler (CIC-6)
Mail Stop B252
Telephone (505) 667-7309

Accessing Computing Machines through the ICN

This table shows how to access open machines on the ICN through MICOM lines, TCP/IP hosts, and DECnet hosts. Additional machines outside the ICN are accessible through TCP/IP and DECnet. To access any of these machines, except for LIS, you must first establish an ICN account, which includes obtaining an ICN password and registering as an ICN user (contact the CIC Customer Service Center for details).

Example: Suppose you want to access the REGISTER machine from MICOM. By referring to the table, you can see that the appropriate command to enter is TIG. Once you connect to the TIG, enter your ICN user number and password as prompted. At the TIG prompt (tig>) enter register and login to the register machine.

TO → / FROM ↓	Hosts reachable from MICOM Lines:(BETA, CANyon, CCVAX, TYMNET, LIS)	TCP/IP Hosts: (BETA, CCVAX, IBM Cluster IOVAX, OFVAX, REGISTER, UNICOS, ACL Hosts, etc.)
MICOM Lines	hostname	TIG TELNET hostname
TCP/IP Hosts (e.g., TIG)	TELNET MICOM hostname	TELNET hostname

Accessing the ICN through Dialup Modem

Dialup access to the ICN is available through the Terminal Internet Gateway (TIG). The TIG is a gateway to the internet and allows you to telnet to ICN machines as well as other machines. Configure your modem and terminal for 8 bit, no parity, one stop bit. Based on your modem, select the appropriate number listed in the table to dial into the TIG. Then enter your ICN user number and password as prompted. At the TIG prompt (tig>) enter a machine name or IP address.

Report problems to the Network Control Center at 667-7423 Monday through Friday, 6 am to 6 pm or at 667-4585 during non-business hours.

Type of Access	Phone Numbers
Microcom Modems from 300 to 28,800 b/s	(505) 667-9020, 9021, 9022, 9023 (Number of Lines: 16) (800) 443-1461 (Number of Lines: 10)
Microcom Modems from 300 to 14,400 b/s	(505) 667- 9024 and 9025 (Number of Lines: 48)
Note: Use the next phone number if the first does not answer properly.	
	Revised August 1995

CUT ALONG DASHED LINE

Los Alamos
National Laboratory

INTEGRATED COMPUTING NETWORK (ICN) VALIDATION REQUEST

To access ICN Computing resources, please complete all parts of this form that apply to you, including "Special Requirements."

If you have **questions**: Call: (505) 665-1805
E-mail: validate@lanl.gov

Mail your completed application to:
ICN Password Office (PWO)
Mail Stop: B271
Los Alamos National Laboratory
Los Alamos, NM 87545

All Laboratory computers, computing systems, and their associated communication systems are for official business only. By completing this request, users agree not to misuse the ICN. The Laboratory has the responsibility and authority to periodically audit user files.

Owner Information

Z-Number (if you have one)	PWO Use Only	Name (last, first, middle initial)
LANL Group	LANL Mail Stop	Citizenship (Foreign National see "Special Requirements-Foreign National")
Phone Number	Cost Center	Program Code

Check LANL affiliation:

- ☐ LANL employee
- ☐ Contractor _____ (specify contract company)
- ☐ Consultant, VSM, associate
- ☐ External user_____ (specify employer)
- ☐ Other (specify)_____

Send password / smartcard to:

☐ Mail Stop or ☐ Mail to address indicated below

Name / Organization

Address

City, State, Zip Code

Access Check access method and needed partitions:

Access method: ☐ ICN Password ☐ Smartcard ☐ Both

☐ **Open** partition (e.g., email systems, open machines)

☐ **Administrative** partition (e.g., IA [BUCS, Stores, Travel], IB [EIS, FMIS, PAIRS])
If you are not a Q-cleared LANL employee, see required steps in section "Special Requirements-Administrative Partition," unless you already have Administrative access with an ICN password.

☐ **Secure** partition (i.e., secure machines) Indicate level(s) of data to be processed:
- ☐ Unclassified
- ☐ Secret

I certify this person does require secure access:

Manager Signature (Group Leader or above) Date

NOTE: A Q-clearance is required. All classified computing must be performed within the Secure environment.

PWO Use Only

New ☐ Change ☐	Clearance Status	Processed	Lv	Smartcard Serial #
Comments:				

Form 1646 (1/95) Supersedes previous versions (rev. 1/25).

Continue

Special Requirements

Administrative Partition
(U.S. Citizens Only) — Lab-Wide Systems (e.g., IA [BUCS, Stores, Travel], IB [EIS, FMIS, PAIRS])

☐ Under 18 years of age

If you need to access Administrative systems, your group leader must provide a memo accepting responsibility for your actions and justifying your need for access. This memo is to accompany all forms taken to the security briefing (see "Contractor or Non-Q-Cleared") section below. You may not access the Secure Partition.

☐ Contractor or Non-Q-Cleared

Phone (505) 667-9444 to obtain Access Authorization packet.

Phone (505) 667-9153 to schedule a security briefing.

Bring all forms including this ICN Validation Request to the security briefing for approval.

Security Briefing Approval Signature	Date

☐ Foreign National

Attach a copy of Form 982 (REQUEST FOR UNCLASSIFIED VISIT OR ASSIGNMENT BY A FOREIGN NATIONAL) with all approval signatures. Be sure Box #11 of Form 982 is completed. If you are not a visitor/assignee under a LANL/DOE approved Visit / Assignment Request, attach written justification from your host Division Director describing your need to access the ICN.

Authorization (required)

Print Manager Name (Group Leader or above)	Manager Z-Number	Group
Manager Signature (Group Leader or above)	**Mail Stop**	**Date**

If you are NOT a LANL employee, obtain your LANL contact's signature in addition to the contact's manager's signature.
NOTE: LANL contacts are regular Laboratory employees. Contacts are responsible for obtaining annual re-authorizations, forwarding renewals, and notifying the ICN Password Office of changes in user or contact status.

Print LANL Contact Name	Contact Z-Number	Phone Number	Group
LANL Contact Signature		Mail Stop	Date

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IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 88 LOS ALAMOS NM

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MAIL STOP B251
ATTN: MIKE FINNEY, MANAGING EDITOR
CUSTOMER SERVICE GROUP (CIC-6)
LOS ALAMOS NATIONAL LABORATORY
PO BOX 1663
LOS ALAMOS NM 87544-9916

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Feedback

New Subscriptions, Deletions, and Changes

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